THE STATE OF THE U.S. OIL AND GAS INDUSTRY

HEARING

BEFORE THE

SUBCOMMITTEE ON
ENERGY RESEARCH AND DEVELOPMENT

OF THE

COMMITTEE ON
SCIENCE, SPACE, AND TECHNOLOGY
HOUSE OF REPRESENTATIVES

ONE HUNDREDTH CONGRESS

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CONTENTS

WITNESSES

May 13, 1988:

	Page
Opening statement of the Hon. Jim Chapman, the Representative in Congress from the First District in Texas	1
Opening statement of the Hon. Rick Boucher, the Representative in Congress from the Ninth District in Virginia	4
Opening statement of the Hon. Dave McCurdy, the Representative in Congress from the Fourth District of Oklahoma	20

PANEL

Quinton B. Carlile, president, Marshall Exploration, Inc., Marshall, TX	5
Prepared statement	10
Dr. William L. Fisher, the University of Texas at Austin, Austin, TX	21
Prepared statement	25
Thomas C. Merritt, secretary-treasurer, Merritt Tool Co., Kilgore, TX	30
Prepared statement	34
Urban F. O'Brien, III, manager of governmental affairs, Mitchell Energy & Development Corp., The Woodlands, TX, on behalf of the Texas Independent Producers and Royalty Owners Association [TIPRO]	43
Prepared statement	47
Dr. Manik Talwani, Schlumberger Professor of Geophysics, Rice University, Houston, TX, and director, Geotechnology Research Institute, Houston Area Research Center [HARC], the Woodlands, TX	52
Prepared statement	56
Panel discussion	77

THE STATE OF THE U.S. OIL AND GAS INDUSTRY

FRIDAY, MAY 13, 1988

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
SUBCOMMITTEE ON ENERGY RESEARCH AND DEVELOPMENT,
Marshall, TX.

The Subcommittee met, pursuant to notice at 10:38 a.m., in the U.S. Courthouse, 100 East Houston Street, Marshall, Texas, the Hon. Jim Chapman presiding.

Mr. CHAPMAN. Let us go ahead and start our proceedings this morning and bring the hearing to order. First, I would like to welcome first my colleague from Virginia, Rick Boucher, who serves with me on the Energy Research and Development Subcommittee of the House Committee on Science, Space, and Technology. In addition to that, Congressman Boucher serves on the Energy and Commerce Committee, which of course is the other Committee of jurisdiction in the area of oil and gas and, in fact, one of the most, if not the most, expansive Committee of substantive jurisdiction in the House of Representatives. Congressman Boucher also serves on the Judiciary Committee and is a very effective and articulate Member of the United States Congress.

Joining us in just a few minutes, and I will introduce him when he does, will be Congressman Dave McCurdy, who is en route from the airport, but we wanted to go ahead and get started. Congressman McCurdy is from Oklahoma.

Also, at this time, I would like to welcome our witnesses here. We are missing one, but we will proceed in order, so Dr. Talwani will perhaps be with us by the time it is his turn to testify.

What I will do I believe is just welcome our witnesses, welcome the folks that are here today in the audience for this hearing. I have a few brief comments I would like to make about basically the thrust of where we are and what we are doing. Then if you will bear with me, we will introduce our witnesses and certainly appreciate their time and their efforts in presenting their testimony here today.

Our Committee fully appreciates the current crisis in the domestic petroleum industry. Because of the recession in the oil patch brought on by the fall in crude oil prices beginning back in 1986, U.S. oil and gas exploration and development budgets have been cut, drilling has fallen off sharply, reserves and production capacity are declining, and the local economic impact and the resulting

human tragedy, particularly here in east Texas of the current situation really cannot be overstated.

Yet there is a lot of room for optimism. Our remaining oil and gas resources are still quite substantial. More than 300 billion barrels, two-thirds of all known U.S. oil, could be made available with the increase of new technologies, enhanced oil recovery. The U.S. proven conventional natural gas reserves can sustain current production levels for at least ten years, and there are additional absolutely vast potential gas reserves that can be tapped using current or advanced technologies to create a reserve base that can assure the availability of gas for decades or even generations to come.

The responsibility for research and development for high-risk recovery methods and exploration has in large measure been shouldered by the smaller independent oil and gas producers who have provided over 60% of U.S. oil and gas reserves since 1978. Independents cannot afford to go it alone though, in the present economic climate. The domestic oil and gas industry has demonstrated its flexibility in the handling of past crises. But the present situation is such that we must examine our basic national energy agenda. A coordinated program between industry, States and the Federal Government I believe is the soundest approach to increased domestic production. We must make increased production a national priority of this country.

Last year, the Department of Energy's Energy Research Advisory Board recommended the creation of a high level Office of Geoscience Research to manage a refocused, multi-disciplinary research program to improve the understanding of geosciences and to develop new recovery tools. To perform this work, the ERAB recommended a substantial boost in funding for oil and gas research—a goal that this Committee has worked to achieve by authorizing $62.4 million for oil and gas R&D for fiscal year 1989, a more than $40 million increase above the Department of Energy's budget request.

In addition, in response to concerns of Congress and industry, the Department of Energy created the Office of Geoscience Research reporting directly to the Assistant Secretary for Fossil Energy and a Hydrocarbon Geoscience Coordinating Committee, to aid in planning of Department of Energy geoscience R&D. In fact, I would like to take this opportunity today to welcome to Marshall and east Texas a part of that new part of the Department of Energy. Hal Chappell is a petroleum engineer and is in the Office of Geoscience Research in the Department of Energy. He works directly under Assistant Secretary Wampler. Mr. Chappell, we are glad to have you with us today—he is sitting here in the front of the courtroom. He actually has come all the way from Wyoming to be with us today, and we appreciate not only the work you do but the tremendous support we have received from Assistant Secretary Wampler.

There are further examples of Federal Government cooperation with those of us interested in increased domestic petroleum production. Last year, the Senate and House conferees passed a Fiscal Year 1988 appropriations bill that increased the budget for existing programs and made specific earmarks for preparation of an analytically based strategic research plan. DOE Assistant Secretary Wampler this year signed a letter of intent to work with the Geo-

science Institute for Oil and Gas Recovery Research, a consortium of universities and State entities in 13 oil and gas producing States, to help develop an analytically, strategic research plan for geosciences and to fund, on a cost-shared basis, much of the research identified in the plan.

In addition, both Houses of Congress have included language in their Fiscal Year 1989 budgets urging the Appropriations Committees to substantially increase funding for multi-disciplinary oil and gas related geosciences and extraction research. Our own Committee, the Committee on Science, Space, and Technology passed an authorization for $62.4 million for oil and gas research and development programs, and created within that authorization a separate Geosciences Initiative of $20 million, $15 million of which is directed for the use of the Geosciences Institute.

Progress has also been made in developing cooperation between the Federal Government and industry to increase domestic production, but there is much, much that remains to be done.

The Windfall Profits Tax should be repealed once and for all. The House and Senate recently passed the Omnibus Trade Bill, which included a repeal of the Windfall Profits tax. The President has said he will veto the measure. I have written personally to the President and had hand delivered to him day before yesterday, a letter from me urging him to sign the trade bill, but indeed if he does veto the legislation, the fight must continue to repeal this punitive and unfair tax. The tax currently collects no revenue, serves absolutely no purpose other than to discourage domestic exploration and investment in the industry.

In addition, the Federal Government should provide genuine incentives for the petroleum industry. Such incentives should and could include restoration of the full 27½ percent depletion allowance for domestic production, petroleum drilling and tax exemptions for new energy discoveries. All natural gas, old as well as new, should be deregulated. Such an action would not only encourage enhanced recovery research, but would result in savings of tax dollars by eliminating costs incurred in Government regulation of natural gas production.

More controversial, but an issue that I believe is vital, is the importance of an oil import fee in any program to encourage domestic petroleum production. A variable tariff which would stabilize crude oil prices at a set amount, would encourage domestic exploration, as well as aid the industry in getting financing. A report by the Senate Budget Committee in 1987 said that a $5 import fee would result in $23.7 billion net benefit to the economy, including a nearly $60 billion budget deficit reduction over a five-year period.

The use of oil and gas is pervasive in the U.S. economy, accounting for two-thirds of our national energy requirements. The demand is particularly widespread in the area of transportation fuels. At this time, there are no immediately available economic substitutes for many petroleum products.

The high concentration of oil reserves in the Middle East increases the likelihood, and virtually guarantees the continued instability of prices and supply. For the foreseeable future, OPEC oil is so abundant that OPEC will be in a position to control world oil

prices and affect the economic health of our nation and the major segments of our industrial base.

For that reason, as well as for national security reasons, and for the economic well-being of the petroleum, oil and gas industry, and the producing regions such as our State of Texas, we must increase domestic oil and gas production. The key to increased production is research and development coupled with incentives to industry. The time is now to develop a national energy policy that includes as an integral component a vigorous domestic oil and gas industry. Working together, the States, the Federal Government and industry can enhance our national security and supply economical, clean and safe energy for years to come.

With those comments, let me now welcome our witnesses to this hearing. Gentlemen, if we can, I would like to proceed in order. Mr. Carlile, I would like to welcome you to this Committee hearing. Quinton Carlile is one of the partners and major owners in Marshall Exploration, and we welcome you.

Before we begin that though, let me recognize my colleague from Virginia for just a moment and ask Congressman Boucher if he would like to make an opening statement.

Mr. BOUCHER. Thank you very much, Mr. Chairman. I am particularly pleased to be here in the town of Marshall today and also in the courtroom of Judge Sam Hall, who was the former Chairman of the Administrative Law Subcommittee on the House Judiciary Committee. When I was first elected to Congress in 1982, I was privileged to serve on that Subcommittee under Sam's leadership and so it is a pleasure to be here in his town and in his courtroom today.

I represent an area in the western part of the State of Virginia where coal is produced. In fact, all of Virginia's coal production is in my Congressional District. And so we have in our area many of the same problems that I am sure you experience here. Energy prices tend to run together and as one rises so does the other, as one falls so does the other. So many of the things that would be of beneficial impact here in the oil and gas producing part of the United States would also affect in a favorable way the coal-producing areas.

In my constituency, we also favor an import fee on oil. In my constituency we also are very strongly in support of the development of a national energy policy. And I am very much looking forward to the evidence and testimony that will be presented by these witnesses today with respect to those issues as well as the need for an increase in research with respect to oil and gas recovery. In our area in southwest Virginia, we know the value of research with respect to coal and I am very much looking forward to hearing what you have to say with respect to how the Federal Government, working with universities and with the industry, can develop a role in support of research in oil and gas as well.

Your Congressman Jim Chapman has taken the lead in the House of Representatives in advancing an agenda for the Federal Government to become more actively involved in advancing oil and gas research. He is making a good case for that, and I very much welcome the opportunity to be with him here today and to hear what you have to say as well.

Thank you very much, Mr. Chairman.

PANEL

Mr. CHAPMAN. Mr. Carlile, as I said is President of Marshall Exploration. We are glad to have you with us today, and Quinton, please proceed in your own fashion. We welcome you to this hearing and look forward to your testimony.

STATEMENT OF QUINTON B. CARLILE, PRESIDENT, MARSHALL EXPLORATION, INC., MARSHALL, TX

Mr. CARLILE. Thank you, Congressman Chapman and also Congressman Boucher—is that correct?

Mr. BOUCHER. Boucher is correct.

Mr. CARLILE. And other Members of the Subcommittee on Energy Research & Development and the various members of the Department of Energy represented here today.

We appreciate you taking the time and effort to come here to Marshall and to visit with us, the people that are involved in oil and gas exploration, and to see and hear some of our problems.

I will be speaking principally from the aspect of an independent oil and gas operator and will not dwell upon the geosciences aspect to any great extent, but will touch upon some of the problems as I perceive them, and I will digress from the written text somewhat as I see that time will permit.

First, as all of us know, the oil and gas operators are not competing with other business concerns, they are competing with foreign governments and cartels. The OPEC cartel particularly has stated on numerous occasions that it is their intent to make it unprofitable for other countries to develop their oil and gas reserves by maintaining prices just below that which you might develop alternative fuel. It has been very successful in that the active rig count in the United States during the past two years has been at the lowest level in the past 40 years. In fact, the average rig count for the first four months of 1988 averaged approximately 750 rigs. Now if you want to know from the standpoint of percentage of operation, we would have to place that somewhere in the 25 percent to 30 percent of effective utilization. In 1981, the active rig count was 3,500 to 3,800 rigs. So with 750 rigs running, it is obvious that we will not be finding the necessary reserves that we need.

In another area, the domestic producers are experiencing substantial cost increases in the products and services, but obviously not in the price of oil and gas. During the past 15 months, tubular goods, the casing and tubing that we have to run in every well, have increased from 40 percent to 50 percent and we have received notification that there will be a further price increase in the next 60 to 90 days. Of course, these prices have been made possible by the restraints or quotas on imports of steel permitted in this country, and since tubular goods represent 20 to 25 percent of the cost of a completed well, it is obvious that this is having a very negative effect upon our exploration efforts and making many prospects uneconomical.

The single most disastrous thing that has happened to the independent oil and gas operators in recent years was the recent

income tax changes which in effect eliminated all income tax benefits in connection with the drilling and production of oil and gas. And you might say "Well, you still can deduct intangible drilling costs, you can still deduct depletion". But the rub here is that both of these items are subject to alternative minimum tax, and those of you that have recently filed your Federal income tax and have had these particular items, have found that your alternative minimum tax probably was the tax that you had to pay. In other words, you will be paying 21 percent on substantially all of these particular items. Now for an investor looking to oil and gas as a possible means of a return—and it is very difficult to get a return today—and he is faced with a 21 percent alternative minimum tax on his investment. He can go put it in the stock market and not have to be subjected to that 21 percent tax, it is obvious that it has almost completely eliminated the individual out there from investing in oil and gas.

The lack of funds flowing to the independent operators has substantially reduced their ability to continue in their exploration efforts. The independents normally drill 80 percent to 90 percent of all wells that are drilled in this country. Congressman Chapman has previously mentioned that the independents find over 60% of the oil and gas. Ultimately, the majors usually come in and buy out the independents after they find the oil and gas, but nevertheless, the independents are the backbone of finding oil and gas in this country and over 80% of all the wells drilled are normally drilled by independents and without the source of funds, particularly investment funds from outsiders, the decrease in exploration activity will escalate, in my opinion, unless institutional type investors move in there, and they have not done that.

All of the money is moving towards buying existing reserves. One company, Prudential-Bache, raised about $500 million with Graham Resources in New Orleans, and you could go on and on, to buy reserves. No one wants to drill for them, they want to buy existing reserves. This does not increase one barrel of oil nor one thousand cubic feet of gas—I would say MCF may be better to use than a thousand.

Moving away from this problem over to the trade deficit temporarily, and you all are more familiar with this than I, but obviously the trade deficit cannot be effectively addressed without dealing with the import of crude oil. There have been many that have predicted we will be importing 50 percent or more of our crude oil within two or three years and all projections seem to indicate that this is correct. We are currently importing between 39 percent and 40 percent of all the crude oil that we are using in this country. Currently, we will burn between 16.9 and 17 million barrels of oil per day in this country and the probability is that we will be importing about 7 million barrels per day by the end of this year. Our current production rate is declining at the rate of about 400,000 to 500,000 barrels per year.

The Nation is currently in the worse position in relation to oil and gas reserves and productivity that it has been in in 50 years. The time is running out for any energy policy that will revive and rejuvenate a dying industry. Obviously, the people in this country will pay dearly for their oil and gas in the future if they permit the

domestic industry to be eliminated by unfair foreign government control of energy pricing and energy markets. Further, we can forget national security because it will be lost if we do not have primarily oil and gas to fire these jet engines and these large engines in these tanks, and et cetera.

I have made the comment a few times—I served in the Air Force during World War II, that it was a lot easier to shoot German planes down on the ground than it was up in the air, when they could not get off the ground for lack of fuel.

Moving to another area that has some optimism to it, is natural gas. In the *Dallas Morning News* this morning, they are quoting Dr. Fisher here in regards to our tremendous gas reserves that are available in this country and also quoting our distinguished Secretary of Energy Herrington, and I think he is trying to get some mileage out of this, that we do not really have any energy problems. I would not want to accuse him falsely.

At any rate, the only problem here is that it says that a substantial portion of these reserves is going to cost $3.00 per thousand cubic feet or more to drill and develop these reserves. In fact, up in the deep reserves up in Oklahoma, it is going to probably cost you $4 or $5 a thousand I would think. Congressman McCurdy, is that not right?

Mr. MCCURDY. Probably a little more than that actually.

Mr. CARLILE. To find them. So selling gas for $1.35, $1.40, the numbers just do not work.

At any rate, there can be a lot of optimism in the area of natural gas. Our Secretary of Energy says that "our growing dependence on imported oil is our Achilles' heel." I was glad to hear him say that. "As a nation we must find ways to reduce dependence on imported oil. We must rely increasingly on the secure American fuels—on coal, nuclear power and natural gas." I would have to scratch nuclear power in view of the problems that we have encountered recently. Consequently, the Department of Energy will "re-evaluate the natural gas resource base in light of new estimation techniques and new technologies for drilling and extraction to assess the potential of natural gas to displace as much as one million barrels of oil per day." These are direct quotes.

We could displace much more than one million barrels of oil per day, but we have got to have some type of energy program and plan which we do not seem to be able to come up with.

Our Texas Railroad Commissioner John Sharp has called for a unified strategy to recapture natural gas markets nationwide that were lost during the Fuel Use Act years. We are sitting here in the middle of natural, gas country, and all of our electricity is being generated by lignite and polluting the air. I am sorry, Charlie, but that is a fact of life. Anywhere you have coal or lignites, you will have pollution to some extent. There has been tremendous progress made in the area of combination of utilizing coal and natural gas and they have reduced the pollution 50 percent to 70 percent in many areas by only a small amount of natural gas. We do not see much published about that.

The obvious question before us—time is of the essence here I realize—is what can the Federal Government do to assist the independent oil and gas operators.

I think there are only a few alternatives, and some of these have already met substantial resistance in Congress. One of the more obvious proposals, and one of the most logical ones, would include an oil import tax on foreign imported oil. You gentlemen know better than I what chance that has of passing in the Congress as it is presently made up. It certainly would be difficult to administer if you plan to have a lot of exemptions and if you are going to rebate that that was used in chemical plants and so forth and so on. I do not know—we would love to see it, but I have my doubts.

Another one that has been used extensively for the steel and automobile industries would be to limit the amount of crude oil imports, but I do not think the people in California would be too happy about that because they would not be able to drive for an hour and a half to get to work or elsewhere. So I do not think the limitation of imports will accomplish the desired results.

The third approach which has been mentioned, and this is not original certainly with me, but I do not know whether it will ever get off the ground. There must be some incentive for the independent operators and their investors to continue financing oil and gas exploration efforts at current price levels, even though there is very little opportunity to make any money from these operations without a sharp price increase in oil and gas. The coal operators have the same problem. You just cannot continue to drill and complete wells when you know up front that at current price levels the best you probably can do is get your money back, and you had your money before you started.

I believe that some form of income tax credit, similar to the investment tax credit, would be very effective in increasing the amount of funds available to independent oil and gas operators. This credit would be calculated as a percentage of the total new well cost and would be deducted without limitation in arriving at the net income tax. Canada has been utilizing these type incentives for sometime. In fact, they have other incentives besides this one, but they refund a substantial portion of the total cost of the well in certain areas. Here I am only talking about 15 percent as a tax credit.

Assume a well costs $600,000 to drill and complete and the exploration tax credit say would be 15 percent. Then you would be looking at $90,000 tax credit. Now it is very important that this credit would be applied against any income tax, either regular tax or alternative-minimum tax, in arriving at the net income tax liability of the taxpayer, or it will not do any good.

The next question that comes to mind is what do we do to offset this loss in revenue. And Gramm-Rudman always dictates that to you. To me it is very simple, the people that want energy have to pay for it in some manner—either you pay for it through a tax directly on energy consumption which would apply to everyone that utilizes energy, on road or off road, and no one wants energy prices to go up, so I do not know. This is the only course of action I know of that has a chance I think.

In conclusion, I would like to point to various chart projections that are attached to this statement. These are courtesy of Goldman Sachs Investment Research. I will not touch upon these other than to say that all of these reports reflect a continuing decline in oil

and gas production rates with a projected increase in consumption. And nothing there is good for us or the country.

It is a pleasure for me to be here and make this brief presentation to you today and I hope that you will be able to go with us out to visit one of our drilling rigs in operation east of Marshall. We attempted to take drill tests and had gone about 800–900 feet last night. At present the pipe is stuck somewhere between 6,000 and 9,000 feet, so we will not be turning to the right or left.

I thank you, gentlemen.

Mr. CHAPMAN. I appreciate your testimony and also that last graphic example of what can go wrong in the exploration for oil and gas.

[The prepared statement of Mr. Carlile follows:]

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Presentation before the Subcommittee on Energy Research & Development, 10:00 A.M. May 13, 1988, U. S. Courthouse, 100 East Houston Street, Marshall, Texas.

BY: Quinton B. Carlile, President, Marshall Exploration, Inc.

1. The oil and gas operators are not competing with other business concerns, rather they are competing with foreign governments and cartels. The OPEC cartel has stated, on numerous occasions, that it is their intent to make it unprofitable for other countries to develop their oil and gas reserves by maintaining a low price for oil and related products. This has been very successful in that the active rig count in the United States during the past two years has been at the lowest level than at any time for the past forty years. (For the first 4 months of 1988 the average count was 750).

2. The domestic producers are experiencing substantial cost increases in the products and services but not the price of oil and gas that they sell. During the past 15 months, tubular goods (casing, tubing, etc.) have increased approximately 40% in price. This is due primarily to the restraints or quotas on imports of steel permitted in this country, and since tubular goods represent 20-25% of the total cost of a completed well, it is obvious that this puts the domestic oil and gas operators at a further disadvantage.

3. The single most disastrous thing that has occurred to the independent oil and gas operator in recent years, is the elimination of income tax benefits in connection with the drilling and production of oil and gas. The alternative minimum tax has effectively eliminated a substantial source of private funds that normally flow to the independent operators for exploration. The lack of any significant tax advantage, and the controlled, below replacement cost prices, has resulted in a squeeze on the independent operators to the point that unless some relief is forthcoming, their future existance is in serious doubt. Over 80% of all wells in this country are drilled by independent operators and without their continued drilling activity the future oil and gas reserves and productivity will continue to reflect substantial declines.

4. This country cannot solve its trade deficit without addressing the number one cause of the trade deficit and that is imported energy, primarily crude oil. Senator Bentsen has predicted that we will be importing 50% or more of our crude oil within 2-3 years and all projections that we see have indicated that

this is correct. We are currently importing approximately 40% of our crude oil needs and this is the single largest factor in the dollars of imports.

5. This nation is currently in the worst position in relation to oil and gas reserves and productivity than it has been in 50 years. The time is running out for any energy policy that will revive and rejuvenate a dying industry. The people in this country will pay dearly for their oil and gas in the future if they permit the domestic industry to be eliminated by unfair foreign government control of energy pricing and energy markets. Further, national security will be lost since all military operations require large amounts of secure energy, primarily oil and gas liquids.

6. Natural gas should be poised to become the U. S. fuel of choice in the near future. DOE Secretary John S. Herrington stated in DOE This Month that "our growing dependence on imported oil is our Achilles' heel. As a nation we must find ways to reduce dependence on imported oil. We must rely increasingly on the secure American fuels - on coal, nuclear power and natural gas." Consequently, the DOE will "reevaluate the natural gas resource base in light of new estimation techniques and new technologies for drilling and extraction to assess the potential of natural gas to displace as much as 1 million bopd."

Meanwhile, Texas Railroad Commissioner John Sharp has called for a unified strategy to recapture natural gas markets nationwide that were lost during Fuel Use Act years. This nation is not running out of natural gas, said Sharp, "in fact, we have 100 to 150 years of gas reserves in Texas alone." Encouraging the promotion of new markets Sharp said, "we have an opportunity now to forge a marriage between gas consuming states concerned about acid rain, and producing states like Texas, which can produce the cleanest fuel available - natural gas."

7. The obvious question before us is - what can the Federal Government do to assist the independent oil and gas operators?

There are only a few alternatives available and some of these have already met substantial resistance in congress. One of the more obvious proposals would include an import tax on foreign oil imported

Presentation by Quinton B. Carlile
President - Marshall Exploration, Inc.

into this country. This tax would be difficult to administer and probably would have exemptions for Canada and Mexico and possibly other countries, plus rebates to chemical plants that export finished products, etc.

Another proposal that is used extensively for the steel and automobile industries would be to limit the amount of crude oil imports, but this could result in shortages of gasoline and heating oil and probably is not acceptable.

An approach that has been mentioned by some members in congress, but not aggressively pursued, is a tax credit for domestic oil and gas exploration. There must be some incentive for the independent operators and their investors to continue financing oil and gas exploration efforts at current price levels, even though there is very little opportunity to make any money from these exploration efforts without a sharp price increase in oil and natural gas.

I believe that some form of income tax credit, similar to the investment tax credit would be very effective in increasing the amount of funds available to independent oil and gas operators. This credit would be calculated as a percentage of the total new well cost and would be deducted without limitation in arriving at the net income tax:
An example: Assume a well cost $600,000 to drill and complete and that the exploration tax credit amounted to 15% - or $90,000. This tax credit of $90,000 probably would offset most of the alternative mimimum tax due by the taxpayer on this investment. Obviously there would have to be limitations in the amount deductible in any year and restricted to taxpayers that invested 100% of their funds in domestic operations.

In conclusion, I would like to call your attention to various chart projections relative to oil and gas production and the related reserves courtesy of Goldman Sachs Investmen Research. All of these reports reflect a continuing decline in oil and gas production rates with a projected increase in consumption.

Presentation by Quinton B. Carlile
President - Marshall Exploration Inc.

It is a pleasure for me to have made this brief presentation to you today, and I hope that you will be able to visit one of our drilling rigs in operation - east of Marshall.

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Table 12

Supply/Demand Relationship, 1983-1989E
(billion cubic feet)

	1983	1984	1985	1986	1987	1988E	1989E
Total consumption (including unaccounted for)	17,478	18,098	17,634	16,646	17,307	17,725	17,825
U.S. dry gas production	16,633	17,392	16,382	15,991	16,298	16,600	16,700
Supplemental gaseous fuels	132	110	126	113	157	100	100
Net withdrawals from storage	448	(197)	234	(147)	19	—	—
Imports (a)	920	843	949	750	898	1,085	1,085
Exports	(55)	(55)	(57)	(61)	(60)	(60)	(60)
Total supply	17,478	18,098	17,634	16,646	17,307	17,725	17,825
Estimated dry gas deliverability	20,100	20,000	19,800	19,200	18,400	17,600	16,800
U.S. dry gas production	16,033	17,392	16,382	15,991	16,298	16,600	16,700
Surplus deliverability	4,067	2,608	3,418	3,209	2,107	1,000	100
Dry gas production as a % of deliverability	79.8%	87.0%	82.7%	83.3%	88.5%	94.3%	99.4%

(a) Canada's export gas volumes represent almost all net imports to the U.S. market. Given the demise of all LNG and Mexican exports, Canada is expected to represent 100% of U.S. imports in 1986 and 1987.

Source: Monthly Energy Review and our estimates.

Table 13

Trends in U.S. Natural Gas Reserves, 1976-1988E

	Gas Wells	Reserve Revisions Extensions and Discoveries (Billions Cubic Ft)	Reserve Additions Per Well (Million Cubic Ft)	Gas Production (Billion Cubic Ft)	% Replacement
1977	12,119	13,978.0	1,070.9	19,163	67.7%
1978	14,405	19,425.0	1,348.5	19,122	101.6
1979	15,166	12,221.0	805.8	19,643	62.2
1980	17,132	16,723.0	976.1	19,403	86.2
1981	19,747	21,446.0	1,086.3	19,181	111.8
1982	18,810	17,288.0	919.1	17,758	97.4
1983	14,505	14,525.0	1,001.2	16,033	90.6
1984	14,982	14,409.0	961.0	17,392	82.8
1985	12,917	11,991.0	920.6	16,382	72.6
1986E	7,918	13,827.0	1,746.3	15,991	86.5
1987E	7,868	8,240.0	1,049.9	16,298	50.6
1988E	8,766	9,204.0	1,050.0	16,600	55.4

Column 1 - API Databook, January 1988, Section 3, Table 23 and Quarterly Completion Report 4 Qtr. 1987, Section 1 page 4.
Column 2 - Advance Summary - EIA, Sept 1987, page 5
Column 3 - Col 2/Col 1
Column 4 - Energy Information Administration/Monthly Energy Review, Nov 1987
Column 5 - Col 7/Col 4

Sources: American Petroleum Institute, Energy Information Administration, and our estimates.

Figure 7

Natural Gas Production vs Deliverability, 1980-1989E

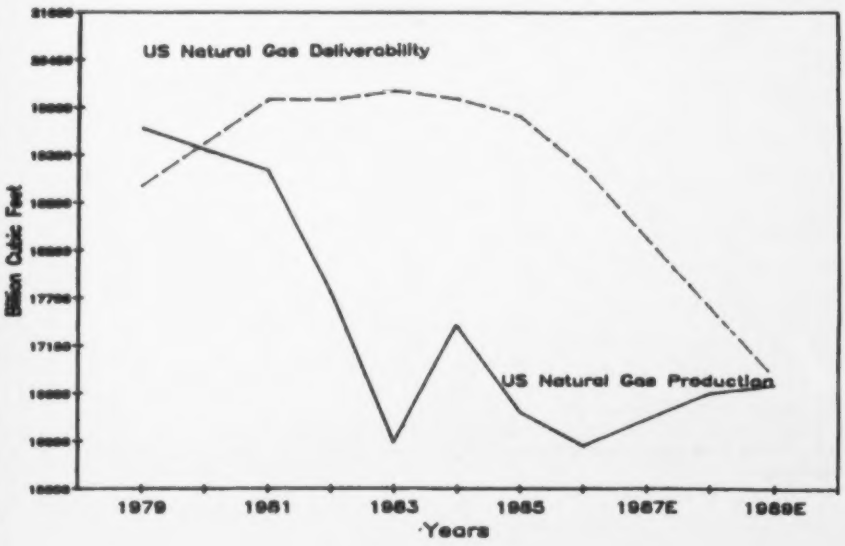

Table 13
U.S. Natural Gas Production Ratios, 1976-1989E
(billion cubic feet)

	Yearend Proved Reserves	Less: Nonproducing Reserves (a)	Proved Producing Reserves	Production (b)	Reserve/ Production Ratio (c) (years)
1976	213.278				
1977	207.413	25.9	181.513	19.163	
1978	208.033	28.5	179.533	19.122	9.5
1979	200.957	24.5	176.457	19.663	9.1
1980	199.021	25.3	173.721	19.403	9.1
1981	201.730	29.8	171.930	19.181	9.1
1982	201.512	28.2	173.312	17.758	9.7
1983	200.247	25.4	174.881	16.033	10.8
1984	197.463	27.5	169.972	17.392	10.9
1985	193.369	32.9	160.500	16.382	10.4
1986	191.585	32.8	158.785	15.991	10.0
1987E			150.0-152.0	16.300 E	9.7
1988E			141.0-144.5	16.600	9.1 E
1989E			132.0-137.0	16.700	8.6 E

(a) Mainly reserves located at Prudhoe Bay.
(b) Taken from the EIA Monthly Energy Review (excludes supplemental gas fuels).
(c) Calculated using prior yearend reserve estimates, and current-year production (producing reserves only).

Table 1

Current Worldwide Oil Supply/Demand Balance

(thousands B/D)

	1981	1982	1983	1984	1985	1986	1987E	1988E	1989E	1990E
CONSUMPTION (Crude/Condensates and NGL)										
OECD:										
North America	18,200	17,200	17,100	17,100	17,400	17,800	18,210	18,640	18,775	18,950
Europe	13,400	12,000	11,800	11,700	11,600	12,100	12,100	12,200	12,300	12,400
Pacific	5,700	5,100	5,000	5,100	5,100	5,100	5,100	5,100	5,400	5,600
Total	36,300	34,300	33,900	33,900	34,100	35,000	35,410	35,940	36,475	36,950
Non-OECD	11,300	11,700	11,700	12,000	12,100	12,600	12,800	13,010	13,540	13,850
Total Consumption	47,600	46,000	45,600	45,900	46,200	47,600	48,210	48,950	50,015	50,800

Worldwide Production (Crude/Condensates and NGL)

SUPPLY (Crude/Condensates and NGL)	1981	1982	1983	1984	1985	1986	1987E	1988E	1989E	1990E
U.S.	10,180	10,200	10,245	10,505	10,545	10,225	9,850	9,700	9,400	8,900
Canada (a)	1,612	1,580	1,668	1,780	1,800	1,795	1,860	1,980	1,875	1,880
Total North America	11,792	11,780	11,913	12,288	12,345	12,020	11,710	11,680	11,275	10,780
Total South America	3,982	4,406	4,588	4,379	4,708	4,569	4,883	5,058	5,189	5,219
Total Western Europe	2,458	3,008	3,423	3,760	3,980	4,137	4,158	4,209	4,112	4,015
Total Middle East Non-OPEC	544	552	631	688	779	893	917	1,015	1,048	1,185
Total Africa	1,332	1,172	1,298	1,515	1,680	1,523	1,740	1,880	1,925	1,955
Total Asia & Australasia	1,216	1,371	1,570	1,821	2,021	2,136	2,099	2,095	2,081	2,062
Total World Outside CPE (excluding OPEC)	23,274	22,299	23,217	24,648	25,418	25,258	25,436	25,850	25,667	25,186
Net Exports from Centrally-Planned Economies	1,600	1,900	2,000	2,000	1,900	2,300	2,400	2,400	2,400	2,300
Net Refinery Gain	900	900	1,000	1,000	1,300	1,100	1,100	1,100	1,100	1,300
Total World Supply (excluding OPEC)	25,774	25,099	26,217	27,648	28,618	28,658	28,936	29,350	29,167	28,586
OPEC										
Crude	22,250	18,609	17,375	17,125	15,965	17,700	17,700	18,100	19,248	20,614
NGL	1,300	1,300	1,300	1,300	1,300	1,600	1,700	1,700	1,700	1,700
Total OPEC	23,550	19,900	18,675	18,325	17,265	19,300	19,400	19,800	20,948	22,314
Total World Supply(including OPEC)	49,158	44,999	44,892	45,973	45,873	48,158	48,336	49,150	50,115	50,900
Government Stock Build	(300)	(300)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)
Company Inventory Drawdown (Increase)	642	1,301	1,008	27	827	(650)	(26)	(50)	0	0
Total Supply	47,600	46,000	45,600	45,900	46,200	47,608	48,210	48,990	50,015	50,800

(a) Includes NGL (including Ethane) and synthetic.

Source: Statistics for 1981-1986 are from BP Statistical Review of World Energy, June 1986

Table 5
Estimated United States Petroleum Balance
(Daily Average in Thousands of 42 Gallon Barrels)

Products Supplied/Supply From Primary Storage	DECEMBER			YEAR-TO-DATE		
	1987[1]	1986[2]	% Change	1987[m]	1986[2]	% Change
Products Supplied:						
Total motor gasoline	7,203	7,143	0.8	7,174	7,034	2.0
Finished leaded motor gasoline[3]	1,485	1,950	(23.8)	1,732	2,180	(20.6)
Finished unleaded motor gasoline[4]	5,718	5,193	10.1	5,442	4,854	12.1
Naphtha-jet	187	209	(10.5)	206	202	2.0
Kerosine-jet	1,242	1,236	0.5	1,152	1,105	4.3
Distillate fuel oil	3,161	3,329	(5.0)	2,957	2,914	1.5
Residual fuel oil	1,377	1,638	(15.9)	1,253	1,418	(11.6)
All other oils[4]	4,216	3,955	6.6	4,090	3,921	4.3
Reclassified[5]	- 322	- 379	(15.0)	- 264	- 313	(15.7)
Total domestic products supplied	17,064	17,131	(0.4)	16,568	16,281	1.8
Exports	715	820	(12.8)	743	785	(5.4)
Total products supplied	17,779	17,951	(1.0)	17,311	17,066	1.4
Supply:						
Domestic production:						
Crude oil[6]	8,236	8,352	(1.4)	8,288	8,680	(4.5)
Natural gas liquids	1,631	1,571	3.8	1,600	1,551	3.2
Other supply[7]	906	678	33.6	884	811	9.0
Total domestic supply	10,773	10,601	1.6	10,772	11,042	(2.4)
Imports:						
Crude oil, total	4,628[10]	4,365[10]	6.0	4,600[10]	4,130[10]	11.4
Canadian	538	581	(7.4)	605	570	6.1
Other	4,090	3,784	8.1	3,995	3,560	12.2
Products, total	2,169	2,288	(5.2)	1,905	2,045	(6.8)
Residual fuel oil	556	913	(39.1)	542	669	(19.0)
Other	1,613	1,375	17.3	1,363	1,376	(0.9)
Total imports (39%)	6,797	6,653	2.2	6,505	6,175	5.3
Total supply	17,570	17,254	1.8	17,277	17,217	0.3
Stock change, all oils	- 209	- 697	XXXX	- 34	+ 151	XXXX

Source: the American Petroleum Institute

HIGHLIGHTS

Imports

Total imports of crude oil and products for February 1988 averaged 6.6 million barrels per day compared to 5.8 million barrels per day in February 1987 (a 12.8% increase). Year-to-date crude oil and product imports are up 11.2% compared to 1987 levels. Crude oil imports are up 12% and product imports are up 9.2% from 1987 levels.

Dr. Fisher, we are glad to have you with us in Marshall today. You have been a valuable resource for this Committee, we welcome you back to this Committee.

Before we begin with your testimony, let me briefly welcome my colleague from Oklahoma, Dave McCurdy. Congressman McCurdy not only serves on the Science, Space, and Technology Committee, he chairs the Transportation, Aviation and Materials Subcommittee of that Committee and serves on the Energy Research & Development Subcommittee as well. Congressman McCurdy also is a very valuable and knowledgeable Member of the House Armed Services Committee and serves with distinction from Norman, Oklahoma. When he was elected in 1980, I believe, Dave was one of, if not the, youngest Member to be elected to the House of Representatives at that time. We welcome him to Marshall and glad to have him as a part of this hearing.

Do you have any comments, Dave?

Mr. MCCURDY. Well Mr. Chairman, I would just like to say briefly thank you for this opportunity. It is good to be back in God's country, even though it is across the river. We occasionally get this far south.

And I want to extend my welcome to our colleague from Virginia also. He is one of the most forceful advocates of the coal industry and certainly understands the problems and dilemmas that industry has, so I think it is important, and it is a compliment to you, Jim, that he came to east Texas to learn a little more about the oil industry. And I must admit we will probably have to end up going to Virginia to learn something about the coal industry, but I think it is important that he have that opportunity.

I have read the testimony of the witnesses as I drove over from the airport in Shreveport and it is a pleasure to meet Mr. Carlile, because as a Member who represents a District that has a lot of deep gas and a lot of oil and a lot of secondary and tertiary recovery which is not going anyplace right now, and also representing the University of Oklahoma—I apologize for that Dr. Fisher—we too are interested and share the same concerns that you do about the viability of the energy industry.

And I just would add one thing, Mr. Chairman, Mr. Carlile mentioned a very important issue and that is one of national security. I spent five years on the House Intelligence Committee and also serve on the Research and Development Subcommittee of the Armed Services Committee, and let me say I do not think that the Joint Chiefs of Staff, the Secretary of Defense nor anyone within this Administration today has given the appropriate amount of detail and concern to national security implications of our increasing dependence on foreign oil, and the lack of the ability to rapidly turn around the production capabilities in our country. When we lose that ability to recover, whether it is shallow oil and gas in my area or deep, once we lose that pressure and that secondary recovery it is not going to be there. And that disturbs me, and I think that is a message that we in the industry do not always make and a case we do not make as well. I just wanted to add that one point.

I appreciate the gentleman from Sulphur Springs actually, from this District, for his involvement in this issue. I would just plug a quick commercial here and that is his efforts—I started before I

changed Subcommittees, on the enhanced gas recovery and enhanced oil recovery efforts in Congress and was not as successful as Jim has been this year in securing an additional $20 million for the Institute, which I think is a major step forward and one that I have to compliment him on, because it was his effort, his diligent pursuit of that money this year in this tight budget, that has enabled us I think to move forward to improve our information base in this vital area. I appreciate him and we in the Congress appreciate him.

And again, I am sorry to interrupt you here but I am glad to be able to participate and hear these witnesses today.

Mr. CHAPMAN. Are you sure you do not want to keep talking? [Laughter.]

Bill Fisher, we are looking forward to your testimony, and if you would proceed in your own fashion. Thank you for being with us.

STATEMENT OF DR. WILLIAM L. FISHER, THE UNIVERSITY OF TEXAS AT AUSTIN, AUSTIN TX

Dr. FISHER. Thank you, Mr. Chairman and Members, it is always a pleasure to be with you.

The oil and gas situation in Texas and Oklahoma, and indeed the entire Nation, is one I would characterize in a moment as one of contrast. We have an industry that still has a lot of problems: the economic depression that was brought on by the OPEC-induced oil price crash in early 1986, and we have got the long-term softening of natural gas prices, in many cases, down below replacement costs. We have, as Mr. Carlile pointed out, some onerous provisions within the current Tax Code which work against, and are negative to it. I think short of any kind of U.S. action directed to this, this economic depression is likely to continue at least for the near term, the next two or three years. I simply do not see any way out of it.

On the other hand, the brighter spot of things, we are seeing a substantial reassessment of the oil and gas resource base in this country, based on recent experience, and that shows that the volumes for future discovery and recovery are ample, and importantly, they are stable. They are not scarce and diminishing as we have held in the past in the views that we have had.

But at the moment, we are simply foregoing a potential for a stable oil and gas production in this country, and that is the unfortunate part of the situation that we are in.

You will find a lot of people, even within the industry, that will argue that U.S. production must inevitably decline; There is not much we can do about it even if we wanted to. You can modify the decline rate some, but inevitably it has got to go down. These are the same people that said the same thing in the 1970's, but what happened in that period of time from the late 1970's up through 1985 was an entirely unpredicted, unprojected thing in the lower 48—mature areas of exploration and development—and we were able to reverse a decline that had reached almost as much as 6% annually, and actually increased production in the lower 48, and we did so in about a half-a-decade's time. The reason that happened is because the ability to add reserves was directly proportional to the effort that we were expending. We used to have the old thesis and the idea that as a resource base was diminishing, the

more you drilled on it, the fewer and fewer reserves that you would encounter and it was really like trying to go up the down escalator. What we really find now is, the analogy is much more near a level playing field in that regard.

And I think understanding why reserves were added equivalent to effort, and were not subject to exponential decline as we held in most of the 1970's, is to begin to really understand the potential for U.S. domestic production. I think it is also a character of the resource base that we ought to be reflecting in public policy. And I think some steps that this Committee has taken have been very much in that direction.

After we had achieved steady and even increase in production in the 1980's, up through 1985, we now see declines. It is not because we have a wasting resource base, but is simply, as Mr. Carlile pointed out, low levels of drilling, just not drilling the holes. I think to move to a stable production level in the United States, wellhead prices have got to be higher than they have been since early 1986, and critically, prices need to be stabilized. Price volatility leads to price uncertainty and that has got to be discounted, so we are not looking at $17 or $18 for a barrel of oil, we are looking at more like $13 or $12 or $14 after you discount for the kind of volatility that exists. We know the resource base that we have now can be accessed on a stable basis, and while we do not need prices perhaps as high as what we saw back in the boom or the early 1980's, they have to be higher than they are now, and importantly, they have to be stable prices. If you are not dealing with an exponentially declining resource base, you do not have to be offsetting that with exponential increases in price. I do not think we have to look forward to $50 and $75 oil, but if we had reasonable prices, moderate levels, stable, it would make a lot of difference in this country.

Economic policy that establishes prices at a sufficient and stable level is really critical. That is one aspect of the resource base that we need to appreciate. Whether that policy is going to be pursued is another matter. At the moment we are not doing very much in that direction, at least as part of the economic policy.

But beyond direct economic policy, I think we need to reassess just how we develop the resource base, how we go about it. It is an ample one, I think even large, from the kinds of calculations that we have made, but it is different in character from what we have historically pursued. Most of our history in developing oil and gas in this country was the discovery and production from large fields. Production came in relatively low-cost, large increments. Today, our remaining resource base, while it is substantial in total volume, is converted to reserves in relatively small increments, modestly smaller-sized fields, extension of known fields either atdepth or areally, in-fill drilling and tertiary recovery; all of those kinds of smaller increment areas are open to us. The economy of scale for big field discovery we do not have any more, we have largely realized that in this country, but the opportunity to increase efficiency in small-increment recovery through research focused on this kind of resource I think is very real.

Industry does spend a lot of money on research, and there will be a National Petroleum Council report out fairly soon that will indi-

cate a very, very substantial amount. I think that is significant and I think it is important. But I want to point out to this Committee that that expenditure is chiefly by major companies that have interests that are international, and in many cases significantly beyond the resource base that we look at in the U.S. lower 48. In some areas of the country, and particularly here in lots of east Texas, north Texas, Oklahoma, there is no longer any significant major company presence at all. You are dealing entirely with the independent producer who has historically gone after the small-increment reserve additions.

The independents can pursue these kinds of resources, and I would argue this has been of profound interest to the United States for the last many years. They can do this chiefly because they operate with low overhead. If you try to mix high overhead and small-increment reserve additions, they do not mix and you will not stay in business very long. But low overhead also means no internal research structure.

I believe there is a real opportunity lying in the equipping and working in connection with the independent and the small operator, equipping them with the best research tools and know-how to get more efficient in recovery and discovery of these small-increment reserves. This would be a sound public investment in research which would have immediate payback, and if our experiences to date in this kind of area holds, the public payback would be many times what we put in.

This Committee, Mr. Chairman, more than any other in Congress that I am aware of, appreciates the value of public investment in oil and gas research—research focused on the kind of resource base we have. Several of us have attempted to address the particular research needs of the remaining resource base in this country by creating a university consortium called the Geoscience Institute for Oil and Gas Recovery Research that you mentioned a little bit earlier. And I want to commend with real appreciation, this Committee and you especially, Congressman Chapman, for efforts in securing a substantial authorization of funds for the Institute and for oil and gas research. This is a major, and I think significant, first step and we appreciate your continuing efforts in appropriations process. It is going to be good for east Texas, Texas, Oklahoma and the Nation, I think. And certainly all of us involved in this area, public and private, I sure commend you for your efforts.

One hears, from time to time, that while oil and gas research is important, it will stem production declines in the U.S. and stem some of our increased reliance on imports only marginally—help a little bit, not a whole lot. I think this is a narrow and perhaps even an erroneous view. I think we have the kind of resource base now that is particularly amenable to the kinds of improved efficiencies that will come through targeted R&D. We need to take that and couple it with some good sound economic policy, and we can see a situation in this country where we can have stable levels of production well into the next century. And if you compare stable levels of production out for the next 20 to 30 or even 40 years, which I really think are achievable, that is profoundly different than what we will otherwise see in continuing levels of U.S. production.

Thank you, Mr. Chairman.

Mr. CHAPMAN. Thank you, Dr. Fisher, we appreciate very much your testimony.

[The prepared statement of Dr. Fisher follows:]

Statement

of

William L. Fisher
The University of Texas at Austin

to

Subcommittee on Energy Research and Development
Committee on Science, Space, and Technology
U.S. House of Representatives
Marshall, Texas

May 13, 1988

Mr. Chairman and Members:

The oil and gas situation in Texas and indeed the Nation is one of contrast. We have an industry still in economic straits from the OPEC-induced crash of oil prices in early 1986 and the longer term softening of natural gas prices, in many cases, to below replacement costs. Short of U.S. action this economic depression will continue for the near term.

On the other hand, we are seeing a substantial reassessment of the oil and gas resource base of Texas and the Nation, based on recent experience, that shows the volumes for future discovery and recovery ample and stable, not scarce and declining as many have held.

At the moment, we are simply foregoing a potential for stable oil and gas production in this Country.

To be sure many will argue that U.S. production must inevitably decline and there is not too much the U.S. can do about it. These same people said the same thing in the 1970's, but the U.S. lower 48 States, believed to be mature and thoroughly explored, responded with unexpected stable production levels. The reason this happened was not only that more wells were drilled, but that the volume of oil and gas reserves added was proportionate to the drilling effort.

To understand why reserves were added equivalent to effort and were not subject to exponential decline, as the conventional wisdom of the 1970's held, is to understand the real potential

of the U.S. for domestic production and also a character of the resource base that should be reflected in public policy.

After steady to increased domestic production of oil in the first half of the 1980's, we now see decline, not from a wasting resource base but from low levels of drilling. To move to stable, not declining, production levels in the U.S., wellhead prices should be higher than they have been since early 1986, but they need not be as high as in the boom of the early 1980's. And critically, prices need to be stabilized; price volatility leads to price uncertainty, which must be discounted by the oil producer and developer. In the 1970's we thought our ability to develop U.S. oil and gas resources was subject to inevitable decline. That was offset by the judgment that prices would have to escalate steadily. We now know the resource base can be accessed on a stable basis; although prices must be higher than now, they can stay stable at real, moderate levels.

Economic policy that establishes prices at sufficient and stable levels is thus critical to future production levels in the U.S. Whether such policy will be pursued is another matter, but it is no less important.

Beyond direct economic policy, we need to reassess how we develop the resource base. It is ample, indeed huge, from our calculations, but it is different in character from that historically pursued. For most of our history, the principal part of production came from the discovery and development of large fields. Production came in relatively low cost, large increments. Today, our remaining resource base of oil and gas

is converted to reserves in small increments, chiefly smaller field discovery, extension of known fields areally or at depth, infill drilling, and tertiary recovery. The economy of scale for big field discovery is largely unavailable, but the opportunity to increase efficiency in small-increment recovery through research focused on this kind of resource is very real.

While industry spends considerable monies on oil and gas research, most of the expenditure is by major companies with international interests significantly beyond the remaining, small-increment resource base of the U.S. Some major companies will, I suspect, make focused efforts at increased efficiency in small-increment reserve additions; others will not.

Historically, in the U.S. small-increment reserve additions have been accomplished by the many small or independent operators. They can pursue these kinds of resources to the profound benefit of the U.S., I would argue, chiefly because they operate with low overhead. High overhead and small-increment reserve additions, however, do not mix very well. But low overhead also means no internal research structure.

Again, while some major companies with internal research structures will pursue the U.S. resource base, I believe a real opportunity lies in equipping the independent and small operator with the best research tools and know-how to become more efficient in discovery and recovery of small-increment reserves. This would be a sound public investment in research with immediate payback and, if our experiences with this kind of

research to date hold, a public payback many times over the public investment.

This Committee, more than any other of which I am aware, appreciates the value of public investment in oil and gas research, research focused at the kind of resource base we have. Several of us have attempted to address the particular research needs of the remaining resource base by creating a University Consortium called the Geoscience Institute for Oil and Gas Recovery Research. And I want to commend, with real appreciation, the Committee, and especially Congressman Chapman for efforts in securing a substantial authorization of funds for the Institute and for oil and gas research.

One hears from time to time that while oil and gas research is important, it will stem the U.S. production declines and the U.S. increased reliance on imports only marginally. This is, I think, an erroneous view. I believe the U.S. oil and gas resource base is one that coupled with sound economic policy and improved efficiencies from targeted research and development can provide stable levels of production far into the next decade. And that, compared with progressive declines in domestic production that will always occur, is of fundamental, even profound importance to the Nation.

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Mr. CHAPMAN. We would like to welcome Mr. Tom Merritt to this hearing this morning. Mr. Merritt of Merritt Tool Company, we appreciate your attendance and look forward to your testimony. You may go ahead and proceed in your own fashion.

STATEMENT OF THOMAS C. MERRITT, SECRETARY-TREASURER MERRITT TOOL CO., KILGORE, TX

Mr. MERRITT. Thank you, Congressman.

Let me begin by giving a commercial to Congressman McCurdy. I met Congressman McCurdy in Norman, Oklahoma giving a seminar for machine shops and welders on how to do business with the Federal Government, and I know Congressman Chapman, you worked closely with him on developing your area to do business with the Defense Department. Congressman McCurdy has done a tremendous job to help the workers in his area and in this area, and Merritt Tool, as a result of your efforts, Congressman, is now a superior vendor to Northrop Corporation in Hawthorne, California. So thank you.

Mr. MCCURDY. I am still trying to get him to build a plant up in my District, Jim, but I cannot get him to cross the river. I do not know what it is.

Mr. CHAPMAN. Well he does have some good judgment.

Mr. MCCURDY. When I saw his testimony, I knew Tommy was here, it is good to see you.

Mr. MERRITT. So thank you, Mr. Chairman and Members of the Committee. My name is Thomas C. Merritt. I serve as the non-paid Secretary-Treasurer of Merritt Tool Company, Inc., a former full-time subcontract oil and gas equipment manufacturer which was established in 1928 by my late father. I am also President of Gregg Industrial Insulators, Inc., a former oil and gas and petrochemical contract insulating company, and managing partner of Merritt Oil and Gas, a non-operating oil and natural gas producing company, Secretary-Treasurer of Merico Abatement Contractors, Inc., an asbestos abatement contractor and Gregg Industrial Services, a grounds maintenance contractor. I might add that I am a royalty owner.

All of these are unusual occupations for one person or one family to be performing. But I must tell you that on December 9, 1983, I testified before the Fossil and Synthetic Fuels Subcommittee that "Merritt Tool Company is doing everything we can to get out of the oil and gas manufacturing business." Today, Merritt Tool is machining 95% defense and aerospace parts. Out of 4,500 suppliers, Merritt Tool employees won LTV's Small Business Supplier of the Year award in 1986, Boeing Helicopter's Golden Eagle and the Small Business Supplier of the Year award in 1987.

Therefore, gentlemen, I appear somewhat of a lessor oil and gas expert, but more an example of a typical oilfield worker and entrepreneur.

So I will begin by contradicting my previous testimony advocating a free market. The independent oil and gas man, who hired and paid for the related contractor services for 85% of the 4,000 drilling rigs, needs an emergency transfusion. If he does not receive it soon, he will need a heart transplant. If he does not receive at-

tention, he and the related industries and their employees will be considered brain dead; plugged in, but not capable of recovery without the help of some new break-through to pay for a recovery.

I will predict that if Congress today gives the industry all the help it asked for, it will take, at the earliest, seven to ten years to reach the 4,000 drilling rig activity level.

My prediction is based primarily on the following:

(1) That oil prices will not be stabilized.

(2) That the investor will be taking his risk on the commodity market, future oil prices rising or falling.

(3) That the Texas banking industry will take at least 10 to 15 years to fully recover from the depression of 1987–1988.

(4) That the oil-field worker will leave this unstable industry if other employment might be found.

(5) That new employees and new graduates will not be forthcoming and entering the industry as their friends and families have in the past years.

(6) And most importantly, the industry has no credibility. By that, I mean each sector of the industry reneged on the deal to have a national energy policy. Banks, producers, service companies, pipelines, and governments gave contractual commitments to each other and all broke their word, shattering the cornerstone of the industry.

If Merritt Tool Company today is asked to build a part for a start-up drilling contractor, the payment terms are cash.

The service industry, machinists, welders, drillers, insulators, roughnecks, engineers, geologists, salesmen, machine operators, truck drivers and crane operators are being absorbed into other industries. And I might add, it has been difficult for the families to adjust to this humiliating experience. These trained workers are not rejoining the oilfield service companies to have a reneged deal.

In 1983, the slogan was "survive to 85." Today it is "consolidate in 88".

Most every major supplier of oilfield equipment and services has merged with their competitors. Most every Texas energy bank has merged or gone out of business.

These mergers force the experienced, higher paid and older workers out onto the streets of Texas. The young worker is not going to risk his job on the independent—the young banker is not going to risk his job on the independent's former ability or word. The young worker left behind in the field does not have the needed experience to service a 10,000 to 15,000 foot well, or sometimes a simple shallow one. Therefore, the major oil companies have started a program called "performance credit," meaning if you fail or make a mistake working on the well, the service company pays the bill plus a penalty. To my knowledge this is not a program being utilized by the independent oil man. One supplier stated "contract negotiations are a cat and dog fight". The operations have been taken away from the field representative and placed in the hands of the lawyers.

When one-time industry partners, service and producers, were working hand-in-hand on R&D, new products were developed. When you take into account the mergers, I would suggest that R&D drilling budgets are 10 to 15 percent of the 1978–1980 levels.

Gentlemen, the service industry, as I would paint the picture, is walking on thin ice. The industry may not respond unless in time of national emergency.

I testified on November 7, 1985, that the following drastic and dangerous events were occurring in the domestic oil and gas industry:

(1) An independent must have capital to drill wells and remain competitive with other producers such as the Government of the United States, Mexico, Canada and OPEC led by giant Saudi Arabia.

(2) Oil price is based on one factor, in my opinion, Saudi Arabia. Saudi Arabia can raise or lower prices at will.

(3) The President and Congress are not tuned in. OPEC is increasing production, and Saudi Arabia is threatening to lower prices to below $20.

(4) The Saudis signed a net-pricing agreement to sell 850,000 barrels of oil to three U.S. companies: Exxon, Texaco and Mobil.

(5) Roughly one-fourth of the Nation's independent companies have sold out, merged or gone out of business in the past two years.

(6) It is cheaper to buy oil on the spot market than to explore for it.

I am not trying to take the attitude of "I told you so"; however, these facts should be restated as well as statements of December 9, 1983, which were:

(1) The Natural Gas Policy Act has served our industry and the Nation well. It provided incentives for our industry to look for and find new reserves of natural gas and oil. It created a broader base of producers who were critically important to the development of the Nation's energy resources. After the enactment of the NGPA, this country experienced the largest rig activity, deeper wells and we recorded a growth in new reserves found in excess of natural gas produced.

(2) OPEC, to this day, controls the energy development of this country by simply raising or lowering prices.

(3) Is Russia's pipeline to European countries not a precedent in the developing free world? Russia is presently comparable to OPEC in exporting oil and natural gas.

(4) We must demonstrate to the world that the United States has and will continue to have a sound energy program.

(5) The national goal of a plentiful, reliable and cost-effective supply of energy resources will develop a sound and secure country for generations to follow.

Enough said about my previous statements. Let me discuss where we are today as a result of no action by the President or Congress.

The President should not veto the trade bill. There is a provision to repeal the burdensome Windfall Profit Tax within the bill. The money presently being used for regulatory purposes could be used for exploration, R&D or a reduction of debt.

The Congress should immediately add vast new incentives to the independent oil and gas investor.

The Congress should mandate the Interior Department to regulate offshore production to reach optimum recoverable reserves.

Congress should stop the depletion of the Elk Hill Naval Petroleum Reserve.

Congress should increase incentives in order to stop the plugging of marginal wells. Something similar to the Richardson-Broyhill Amendment in 1983.

Congress has seen the volatile Persian Gulf countries react to our friendship. We have seen them match our so-called friendship against the Russians.

You have seen our bombers prevented from flying over so-called friendly countries in order to attack Libya, because the countries were importers of Persian crude oil.

You saw our ally Great Britain provide the airstrip because they are an exporter of crude oil.

Starting in December of 1985, the Saudis dumped two million barrels of crude oil per day into the market. As a result, prices plunged 60 percent to some $9 per barrel, in just 90 short days.

Our consumption has risen 500,000 barrels per day. Domestic production has declined more than one million barrels per day. Our imports have risen more than 1,250,000 barrels per day. Our country is on a collision course.

As our domestic oil and gas industry continues to disintegrate, we have become more dependent upon increased quantities of imported oil. There is only one area of the world where we can obtain the additional supply of oil to meet our requirements, and that is from the Middle East. Two-thirds of the crude oil reserves in the whole Free Western World are located in the Middle East, the biggest share of that is in the Persian Gulf area owned by Arab nations and Iran. As we all know, that is the tinderbox of the world. Our fleet is there today, protected by the ocean. When do we send in the Marines?

I ask you, can we depend on them to supply us with the oil that we will need? We have seen them refuse to sell it to us in the past. Will we see history repeat itself?

Ladies and gentlemen, we need more R&D funding and the funds necessary to drill for new domestic oil and gas reserves.

Thank you for your attention.

Mr. CHAPMAN. Thank you, Tommy, for your remarks and your testimony. We appreciate it very much.

[The prepared statement of Mr. Merritt follows:]

TESTIMONY OF

THOMAS C. MERRITT
P. O. BOX 1209
KILGORE, TEXAS 75662

BEFORE THE

SUBCOMMITTEE ON
ENERGY RESEARCH AND DEVELOPMENT
OF THE
COMMITTEE ON
SCIENCE, SPACE, AND TECHNOLOGY
HOUSE OF REPRESENTATIVES
ONE HUNDREDTH CONGRESS

MAY 13, 1988

U. S. HOUSE OF REPRESENTATIVES

SUBCOMMITTEE ON ENERGY RESEARCH AND DEVELOPMENT

TESTIMONY OF THOMAS C. MERRITT

MAY 13, 1988

MR. CHAIRMAN, MEMBERS OF THE COMMITTEE;

THANK YOU. MY NAME IS THOMAS C. MERRITT. I SERVE AS THE NONPAID SECRETARY-TREASURER OF MERRITT TOOL COMPANY, INC., A FORMER FULL TIME SUBCONTRACT OIL AND GAS EQUIPMENT MANUFACTURER WHICH WAS ESTABLISHED IN 1928 BY MY LATE FATHER. I AM ALSO PRESIDENT OF GREGG INDUSTRIAL INSULATORS, INC., A FORMER OIL AND GAS AND PETROCHEMICAL CONTRACT INSULATING COMPANY, AND MANAGING PARTNER OF MERRITT OIL AND GAS, A NON OPERATING OIL AND NATURAL GAS PRODUCING COMPANY, SECRETARY-TREASURER OF MERICO ABATEMENT CONTRACTORS, INC., AN ASBESTOS CONTRACTOR AND GREGG INDUSTRIAL SERVICES, A GROUNDS MAINTENANCE CONTRACTOR. I MIGHT ADD THAT I AM A ROYALTY OWNER.

ALL OF THESE ARE UNUSUAL OCCUPATIONS FOR ONE PERSON OR ONE FAMILY TO BE PERFORMING. BUT I MUST TELL YOU THAT ON DECEMBER 9, 1983, I TESTIFIED BEFORE THE FOSSIL AND SYNTHETIC FUELS SUBCOMMITTEE THAT "MERRITT TOOL COMPANY IS DOING EVERYTHING WE CAN DO TO GET OUT OF THE OIL AND GAS MANUFACTURING BUSINESS." TODAY, MERRITT TOOL IS MACHINING 95% DEFENSE AND AEROSPACE PARTS. MERRITT TOOL EMPLOYEES WON OUT OF 4500 SUPPLIERS, LTV'S "SMALL BUSINESS SUPPLIER OF THE YEAR" AWARD IN 1986, BOEING HELICOPTER'S PHILADELPHIA "GOLDEN EAGLE", AND THE "SMALL BUSINESS SUPPLIER OF THE YEAR" AWARD IN 1987.

THEREFORE, GENTLEMEN, I APPEAR SOMEWHAT OF A LESSOR OIL AND GAS EXPERT BUT MORE AN EXAMPLE OF A TYPICAL OILFIELD WORKER AND ENTREPRENEUR.

SO I WILL BEGIN BY CONTRADICTING MY PREVIOUS TESTIMONY ADVOCATING A FREE MARKET. THE INDEPENDENT OIL AND GAS MAN, WHO HIRED AND PAID FOR THE RELATED CONTRACTOR SERVICES FOR USE OF THE 4,000 DRILLING RIGS, NEEDS AN EMERGENCY TRANSFUSION. IF HE DOES NOT RECEIVE IT SOON, HE WILL NEED A HEART TRANSPLANT - IF HE DOES NOT RECEIVE ATTENTION HE WILL AND THE RELATED INDUSTRIES AND EMPLOYEES WILL BE CONSIDERED BRAIN DEAD. PLUGGED IN --- BUT NOT CAPABLE OF RECOVERY WITHOUT THE HELP OF SOME NEW BREAK THROUGH TO PAY FOR A RECOVERY.

I WILL PREDICT THAT IF CONGRESS TODAY GIVES THE INDUSTRY ALL THE HELP IT ASKED FOR, IT WILL TAKE, AT THE EARLIEST, 7 TO 10 YEARS TO REACH THE 4000 DRILLING RIG ACTIVITY LEVEL.

MY PREDICTION IS BASED PRIMARILY ON THE FOLLOWING:

(1) THAT OIL PRICES WILL NOT BE STABILIZED.

(2) THAT THE INVESTOR WILL BE TAKING HIS RISK ON THE COMMODITY MARKET - FUTURE OIL PRICES RISING OR FALLING.

(3) THAT THE TEXAS BANKING INDUSTRY WILL TAKE AT LEAST 10 - 15 YEARS TO FULLY RECOVER FROM THE DEPRESSION OF 1987 - 1988.

(4) THAT THE OILFIELD WORKER WILL LEAVE THIS UNSTABLE INDUSTRY IF OTHER EMPLOYMENT MIGHT BE FOUND.

(5) THAT NEW EMPLOYEES AND NEW GRADUATES WILL NOT BE FORTHCOMING AND ENTERING THE INDUSTRY AS THEIR FRIENDS AND FAMILIES HAVE IN THE PAST.

(6) AND MOST IMPORTANTLY, THE INDUSTRY HAS NO CREDIBILITY. BY THAT I MEAN EACH SECTOR OF THE INDUSTRY RENEGED ON THE DEAL TO HAVE A NATIONAL ENERGY POLICY. BANKS, PRODUCERS, SERVICE COMPANIES, PIPELINES, AND GOVERNMENTS GAVE CONTRACTUAL COMMITMENTS TO EACH OTHER AND ALL BROKE THEIR WORD.

IF MERRITT TOOL COMPANY, TODAY, IS ASKED TO BUILD A PART FOR A START-UP DRILLING CONTRACTOR, THE PAYMENT TERMS ARE CASH.

THE SERVICE INDUSTRY, MACHINIST, WELDERS, DRILLERS, INSULATORS, ROUGHNECKS, ENGINEERS, GEOLOGIST, SALESMEN, MACHINE OPERATORS, TRUCK DRIVERS, CRANE OPERATORS ARE BEING ABSORBED INTO OTHER INDUSTRIES. AND I MIGHT ADD, FOR THE FAMILIES THIS EXPERIENCE HAS BEEN HUMILIATING AND DIFFICULT TO ADJUST. THESE TRAINED WORKERS ARE NOT REJOINING BACK TO THE OILFIELD SERVICE COMPANY TO HAVE A RENEGED DEAL.

IN 1983 THE SLOGAN WAS "SURVIVE TO 85." TODAY IT IS "CONSOLIDATE IN 88."

MOST EVERY MAJOR SUPPLIER OF OILFIELD EQUIPMENT AND SERVICES HAVE MERGED WITH THEIR COMPETITORS. MOST EVERY TEXAS ENERGY BANK HAS MERGED OR BEEN CLOSED.

THESE MERGERS FORCE THE EXPERIENCED, HIGHER PAID AND OLDER WORKERS OUT ONTO THE STREETS OF TEXAS. THE YOUNGER WORKER LEFT BEHIND DOES NOT HAVE THE NEEDED EXPERIENCE TO SERVICE A 10,000 - 15,000' WELL OR SOMETIMES A SIMPLE SHALLOW ONE. THEREFORE, THE MAJOR OIL COMPANIES HAVE STARTED A PROGRAM CALLED "PERFORMANCE CREDIT". MEANING, IF YOU FAIL OR MAKE A MISTAKE WORKING ON THE WELL. THE SERVICE COMPANY PAYS THE BILL PLUS A PENALTY. TO MY KNOWLEDGE THIS IS NOT A PROGRAM BEING UTILIZED BY THE INDEPENDENT OIL MAN. ONE SUPPLIER STATED "CONTRACT NEGOTATIONS ARE A CAT AND DOG FIGHT". THE OPERATIONS HAVE BEEN TAKEN AWAY FROM THE FIELD REPRESENTATIVE AND PLACED IN THE HANDS OF THE LAWYERS.

WHEN ONE TIME INDUSTRY PARTNERS, SERVICE AND PRODUCERS, WERE WORKING HAND IN HAND ON R & D; NEW PRODUCTS WERE DEVELOPED. WHEN YOU TAKE INTO ACCOUNT THE MERGERS, I WOULD SUGGEST THAT R & D DRILLING BUDGETS ARE 10 - 15% OF THE 1978 - 1980 LEVELS.

GENTLEMEN, THE SERVICE INDUSTRY, AS I WOULD PAINT THE PICTURE, IS WALKING ON THIN ICE. THE INDUSTRY WILL NOT RESPOND

I TESTIFIED ON NOVEMBER 7, 1985 THAT THE FOLLOWING EVENTS WERE DRASTICALLY AND DANGEROULY OCCURING IN THE DOMESTIC OIL AND GAS INDUSTRY.

(1) "AN INDEPENDENT MUST HAVE CAPITAL TO DRILL WELLS, TO STAY COMPETITIVE WITH OTHER PRODUCERS SUCH AS THE GOVERNMENT OF THE UNITED STATES, MEXICO, CANADA, AND OPEC LED BY GIANT SAUDIA ARABIA."

(2) "OIL PRICE IS BASED ON ONE FACTOR, IN MY OPINION, SAUDIA ARABIA. SAUDIA ARABIA CAN RAISE OR LOWER PRICES AT WILL."

(3) "THE PRESIDENT AND CONGRESS ARE NOT TUNED IN. OPEC IS INCREASING PRODUCTION, AND SAUDIA ARABIA IS THREATENING TO LOWER PRICES TO BELOW $20."

(4) "THE SAUDIS SIGNED A NET PRICING AGREEMENT TO SELL 850,000 BARRELS OF OIL TO THREE U.S. COMPANIES; EXXON, TEXACO, MOBIL."

(5) "ROUGHLY ONE-FOURTH OF THE NATION'S INDEPENDENT OIL COMPANIES HAVE SOLD OUT, MERGED, OR GONE OUT OF BUSINESS IN THE PAST 2 YEARS."

(6) "IT IS CHEAPER TO BUY OIL ON THE SPOT MARKET THAN TO EXPLORE FOR IT."

I AM NOT TRYING TO TAKE THE ATTITUDE OF I TOLD YOU SO; HOWEVER, THESE FACTS SHOULD BE RESTATED AS WELL AS STATEMENTS OF DECEMBER 9, 1983 WHICH WERE:

(1) "THE NATURAL GAS POLICY ACT HAS SERVED OUR INDUSTRY AND THE NATION WELL. IT PROVIDED INCENTIVES FOR OUR INDUSTRY TO LOOK FOR AND FIND NEW RESERVES OF NATURAL GAS AND OIL. IT CREATED A BROADER BASE OF PRODUCERS WHO WERE CRITICALLY IMPORTANT TO THE DEVELOPMENT OF THE NATION'S ENERGY RESOURCES. AFTER THE ENACTMENT OF THE NGPA, THIS COUNTRY EXPERIENCED THE LARGEST RIG ACTIVITY, DEEPER WELLS, AND WE RECORDED A GROWTH IN NEW RESERVES FOUND IN EXCESS OF NATURAL GAS PRODUCED."

(2) "OPEC TO THIS DAY CONTROLS THE ENERGY DEVELOPMENT IN THIS COUNTRY BY SIMPLY RAISING OR LOWERING OF PRICES."

(3) "IS RUSSIA'S PIPELINE TO EUROPEAN COUNTRIES NOT A PRECEDENT IN THE DEVELOPING FREE WORLD? RUSSIA IS PRESENTLY COMPARABLE TO OPEC IN EXPORTING OIL AND NATURAL GAS."

(4) "WE MUST DEMONSTRATE TO THE WORLD THAT THE UNITED STATES HAS AND WILL CONTINUE TO HAVE A SOUND ENERGY PROGRAM."

(5) "THE NATIONAL GOAL OF A PLENTIFUL, RELIABLE, AND COST EFFECTIVE SUPPLY OF ENERGY RESOURCES WILL DEVELOP A SOUND AND SECURE COUNTRY FOR GENERATIONS TO FOLLOW."

ENOUGH SAID ABOUT MY PREVIOUS STATEMENTS. LET ME DISCUSS WHERE WE ARE TODAY AS A RESULT OF NO ACTION BY THE PRESIDENT OR CONGRESS.

THE PRESIDENT SHOULD NOT VETO THE TRADE BILL. THERE IS NO PROVISION TO REPEAL THE WINDFALL PROFITS TAX WITHIN THE BILL. THE MONEY USED FOR REGULATORY PURPOSES COULD BE USED FOR EXPLORATION AND R & D. THE SIMPLE PASSAGE OF THE BILL BY CONGRESS SENDS THE MESSAGE TO THE OILFIELD WORKER AND ENTREPRENEUR THAT CONGRESS RECOGNIZES A PROBLEM.

THE CONGRESS SHOULD IMMEDIATELY ADD VAST NEW INCENTIVES TO THE INDEPENDENT OIL AND GAS INVESTOR.

THE CONGRESS SHOULD FORCE THE INTERIOR DEPARTMENT TO REGULATE OFFSHORE PRODUCTION TO REACH OPTIMUM RECOVERABLE RESERVES.

CONGRESS SHOULD STOP THE DEPLETION OF ELK HILL NAVAL PETROLEUM RESERVE.

CONGRESS SHOULD INCREASE INCENTIVES IN ORDER TO STOP THE PLUGGING OF MARGINAL WELLS. SOMETHING SIMILIAR TO THE RICHARDSON - BROYHILL AMENDMENT IN 1983.

CONGRESS HAS SEEN THE VOLITOLE PERSIAN GULP COUNTRIES RE-ACT TO OUR FRIENDSHIP. WE HAVE SEEN THEM MATCH OUR SO CALLED FRIENDSHIP AGAINST THE RUSSIANS.

YOU HAVE SEEN OUR BOMBERS DIVERTED OVER SO-CALLED FRIENDLY COUNTRIES IN ORDER TO ATTACH LYBIA, BECAUSE THE COUNTRIES WERE IMPORTERS OF PERSIAN CRUDE OIL.

YOU SAVE OUR ALLY GREAT BRITIAN PROVIDE THE AIRSTRIP BECAUSE THEY ARE AN EXPORTER OF CRUDE.

STARTING IN DECEMBER OF 1985 THE SAUDIS DUMPED 2 MILLION BARRELS OF CRUDE PER DAY INTO THE MARKET. AS A RESULT, PRICES PLUGGED 60% TO SAVE $9.00 PER BARREL IN JUST 90 DAYS.

OUR CONSUMPTION HAS RISEN 500,000 BARRELS (FIVE HUNDRED THOUSAND) PER DAY. DOMESTIC PRODUCTION HAS DECLINED 1,000,000 (ONE MILLION) BARRELS PER DAY. OUR IMPORTS HAVE RISEN 1,250,000 BARRELS PER DAY.

CONGRESSMEN, I ASK YOU, WHERE ARE WE GOING TO GET OUR OIL? TWO-THIRDS OF THE PROVEN RESERVES ARE LOCATED IN THE PERSIAN GULF OWNED BY ARAB NATIONS AND IRAN.

OUR FLEET IS THERE TODAY, PROTECTED BY THE OCEAN. WHEN DO WE SEND IN THE MARINES?

THE COUNTRY IS ON A COLLISION COURSE. PLEASE CORRECT IT SOON.

THANK YOU FOR YOUR ATTENTION.

Mr. MCCURDY. Mr. Chairman, could I ask Tommy when he is going to stop beating around the bush and tell us what he really thinks? [Laughter.]

That is a good statement, Mr. Merritt. I think we need to get him before the Ways and Means Committee. Perhaps our good friend Mike Andrews can invite him up. I think he would be an excellent witness to get in front of them.

Mr. CHAPMAN. Thank you. Your comments are well taken.

Obie O'Brien is here representing the Royalty Owners and Producers Association of Texas, TIPRO. We welcome you to the Committee and look forward to your testimony. You may proceed, Mr. O'Brien.

STATEMENT OF URBAN F. O'BRIEN III, MANAGER OF GOVERNMENTAL AFFAIRS, MITCHELL ENERGY & DEVELOPMENT CORP., THE WOODLANDS, TX, ON BEHALF OF THE TEXAS INDEPENDENT PRODUCERS AND ROYALTY OWNERS ASSOCIATION [TIPRO]

Mr. O'BRIEN. Thank you very much, Congressman, and I want to say thank you for your leadership on this issue and for the initiative you have taken in bringing the Committee outside the "Beltway" and down to Texas so they can see firsthand the problems we face and the situation we are in. I hope Mr. Boucher enjoys his trip to Texas, I am sure it will be very educational for him.

My name is Obie O'Brien and I am the Manager of Governmental Affairs for Mitchell Energy & Development. We are an independent oil and gas producing company based out of The Woodlands, Texas, which is about 250 miles south of here on the other end of this pine forest. I have got to tell you that all these pine trees kind of make me nervous. I am a salt-water sailor in my spare time.

But I am here today as a representative of TIPRO, the Texas Independent Producers and Royalty Owners Association. TIPRO is an association composed of more than 4,000 independent oil and gas producers and royalty owners, mostly in Texas. We do have some members in Oklahoma and Louisiana.

Increased funding for energy research and development, especially in the area of fossil fuels, has long been a priority issue for TIPRO. In fact, our charter mandates that as an association we are to "support all efforts to expand sound energy research and development activity in the United States", and we have done that on many levels; at the State level and the Federal level, and as an association we have tried to get a greater commitment from our members and others in the private sector to fund these kinds of programs on their own, but the collapse of the oil and gas price structure has rendered those programs virtually non-existent.

I was asked to provide an overview of the situation from the producer's point of view. To do that, you have got to go back to the price collapse. There are several things we know about it. We know it was engineered by OPEC and in particular, Saudi Arabia, to increase what they saw as a dwindling market share. That may or may not have been beneficial to them, and you can argue about that all day. But we do know several things.

One, that in response to the falling prices that were engineered, demand and consumption in this country increased dramatically. Also, as a result of those depressed prices, drilling activity, the search for new sources of oil and gas, and attempts to increase production from known reserves have come to a virtual standstill.

Because of those two factors, reduced drilling and increased demand, our nation has now become more dependent on foreign sources of oil than at any time since the energy crisis in the 1970's. We have become more vulnerable to supply shortages and any kind of price changes in the world market.

Today as we sit here, we depend on foreign sources of oil to supply more than 44 percent of the oil we consume, and it is estimated that by the 1990's, we could be importing well over 50 percent or even 60 percent of our energy needs. I think a very telling parallel is that at the height of the energy crisis in the 1970's, we imported 47 precent of our oil and I think the 44 percent import level we are at now indicates how dangerous the situation has become.

This situation has caused a severe economic dislocation, especially in Texas and Oklahoma and Louisiana. I think there have been several studies that indicate that if you net out the economic damage and take into account the increased economic activity in oil-consuming States, based on the low price of oil, and net out the damage, we are still down—the national economy is still down to the tune of billions of dollars. And you have got to add into that the lost jobs, the bank closings, the corporate bankruptcies and it doesn't just stop with the oil and gas industry, it goes to every kind of support industry, stores, gasoline stations, everything else. And the only way to get a full idea of how much it costs is you have got to add in the millions of dollars that we spend every day maintaining our fleet in the Persian Gulf, and the loss of life that has already taken place on the U.S.S. Stark and the potential loss of life not just for Americans, but others in that area.

Because of this situation, we in TIPRO are very pleased to see this Committee not only increase the funding for the FY 1989 budget, but also that you are still looking into this situation.

It is ironic that the United States is the largest consuming nation and the second largest producing nation and yet here we sit. We can barely provide half of our own energy needs. But we know that we have reserves, both known and suspected, to produce four times as much oil and gas as has been produced to date in the history of the country. However, at today's prices and with today's technology, we can only get to about a third of that with any kind of reasonable financial expectation of return. In addition to the cost, you have to look at the time problem. You just don't go out and turn on a pump jack and have oil and gas come out of the ground.

In any kind of tertiary recovery situation from the initial engineering on through actual production, you are talking about years. So where are we? We have two choices, as TIPRO sees it—we have two choices. We can sit back and wait for prices to go up, leave all of our oil and gas in the ground until prices get to a level where we can afford to produce it. We do not think that is likely to happen any time soon. The outlook is for low prices and price instability—

that is the outlook for the next five to six years. OPEC is continuing its internal struggle. Look at the collapse in the last meeting between OPEC and non-OPEC countries. And as a result what you have is a price set on Wall Street. The price is not set by supply and demand factors, the price is set by futures traders in the NYMEX markets and in the futures commodity markets. It is our position that those people setting the price would probably be the subject for another hearing on the new money changers in the temple. These people trade oil and gas futures and play basic national defense resources of the United States with onions and oranges. And it is something that I think also needs to be addressed.

So if the price is not going to go up—and we are not going to sit around and wait for it to go up—we have got to try to compete at the current-price levels. And that means we have to develop new technologies that are more effective and less costly for finding reserves and for producing more from existing fields.

We support the work that is being done at the universities in Texas and organizations such as HARC, which Dr. Talwani is in charge of, the Houston Area Research Center. We think what they have is extremely promising. The technological advancements that they are looking at will improve efficiency and reduce cost and will allow us to increase domestic production. That, in turn, should decrease our dependence on foreign oil and will not only strengthen our national and industrial security, but also help to cushion the shock to our economy of the price increases that are sure to come.

We believe that if we sit back and wait for the prices to go up, do not try to look at these new technologies, do not try to compete at this price level, that when OPEC does get its act together and the price does go up, we are importing 50 percent to 60 percent of our oil and they run the price up to $25–$30 per barrel, the economic dislocation that is taking place now and took place in the 1970's will look like a cake walk. It will be devastating to the oil-consuming sectors of our country, and unfortunately we will probably get into another regional civil war between the producing and the consuming States that will result in the same kind of paralysis that we have seen in Congress and on the part of the Administration over the last ten years.

TIPRO supports these efforts toward increased funding. It is disconcerting—I want to emphasize this is the strongest word the TIPRO staff would let me use—that the Department of Energy spends only four-tenths of one percent of its non-defense research budget on oil and gas. We believe a significant investment in all aspects of research and development is necessary to enhance the recoverability of already discovered and potential U.S. reserves.

TIPRO urges the Committee, Congress and the Administration to address this issue and increase funding for these programs. Such a move is certainly no substitute for a comprehensive national energy policy, but then again we are probably not going to get one of those at least until the end of this year when we hopefully get a change of Administration, but it would be a major step in the right direction. We appreciate you looking at it and we appreciate the increased funding that you have already accomplished and we hope that you can get more for us.

Thank you very much.

Mr. CHAPMAN. Thank you, Mr. O'Brien, for your testimony. We appreciate your being here and appreciate the work of TIPRO and particularly Mitchell Energy's commitment to providing assistance in this area.

[The prepared statement of Mr. O'Brien follows:]

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TESTIMONY

Before

The Energy Research and Development Subcommittee

Of The

House Committee on Science, Space, and Technology

Presented By

Obie O'Brien

Texas Independent Producers and Royalty Owners Association
Austin, Texas

Marshall, Texas
May 13, 1988

TIPRO

Texas Independent Producers & Royalty Owners Association

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My name is Obie O'Brien and I am the Manager of Governmental Affairs for Mitchell Energy & Development Corp. in The Woodlands, Texas. I appreciate the opportunity to address this Committee as a representative of TIPRO, The Texas Independent Producer and Royalty Owners Association. TIPRO is an association composed of more than 4,000 independent oil and gas producers and royalty owners.

Increased funding for energy research and development, especially for fossil fuels, has long been a priority issue for TIPRO and its members. Current membership mandates the Association to "support efforts to expand sound research and development activity in the United States aimed at maximizing recovery of domestic petroleum reserves..."1/

TIPRO has supported many initiatives to increase funding for energy research on both the state and federal levels. The Association has also urged a greater commitment to such programs from the private sector; although with the collapse of oil and gas prices, such efforts by individual companies are fewer and fewer.

The price structure collapse created two very serious problems that pose a grave threat to both our domestic industry and to our country's national security.

First, in response to falling prices, demand and consumption increased

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(1) Resolution number 8 of the National Energy Policy Committee from the TIPRO 1987 Annual Report, page iv.

dramatically. Further, as a result of depressed prices, drilling activity, the search for new sources of oil and gas, and the attempts to increase production from known reserves came to a virtual standstill.

Second, because of reduced drilling and increased demand,our nation has become dependent on foreign sources of oil, making the United States vulnerable to supply shortages and significant price changes in the world market.

Today we depend on foreign sources to supply 44% of the oil we consume, and it is estimated that by the 1990s we could import well over 50 or even 60 percent of our energy needs. 2/ At the height of the energy crisis of the 1970s, we imported 47 percent of our oil. That is a very telling parallel, and it indicates how dangerous the situation has become.

In addition to the lost jobs, bank closings, corporate bankruptcies, and general economic dislocation, the real cost of our present crisis must also include the millions of dollars and the potential loss of life associated within our maintaining a fleet in the Persian Gulf.

That's why we are very pleased to see this Committee's interest in energy research and development.

We have the reserves both known and suspected to produce 4 to 5 times as much oil and gas as we have produced to date. However, at today's prices and with today's technology, producing that oil is financially infeasible because prices cannot support the cost of such production. Only about one out of every three barrels of oil in place can be economically recovered with current technology, and the time required to improve the industry's productive capacity

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(2) National Petroleum Council, "Factors Affecting U.S. Oil & Gas Outlook", Feb. 1987, page 6.

will depend on both the depth and duration of reduced prices and other disincentives. 3/

An enhanced oil recovery project can take years to move from preliminary engineering to the beginning of tertiary production. This time lag, not just the reduction in exploration and production activity, will act to further increase U.S. energy vulnerability.

Prices are not likely to go up significantly any time soon. The outlook is for more price instability as OPEC continues its internal struggle, and as traders on Wall Street set prices based on rumor and profiteering rather than on supply and demand.

Therefore, we must develope new technologies that are more effective and less costly for finding new reserves and for producing more from existing fields.

The work in this area being done by our universities, by our industry, and by organizations such as HARC, the Houston Area Research Council, is extremely promising. Technological advancements that improve efficiency and reduce cost will allow us to increase domestic production. That, in turn, should decrease our dependence on foreign oil and will not only strengthen our national and industrial security, but it will also help to cushion the shock to our economy of the price increases that are sure to come.

TIPRO supports efforts to increase funding for the energy research. It is disconcerting that the Department of Energy spends only .4 (four-tenths) of 1% of its non-defense research budget on oil and gas research. Significant investment in all aspects of research and development is necessary to enhance

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(3) Ibid, page 10.

the recoverability of already discovered and potential U.S. reserves that would otherwise be unrecoverable.

TIPRO urges the Committee, Congress and the Administration to address this issue and increase funding for these programs. Such a move is certainly no substitute for a comprehensive national energy policy, but it would be a major step in the right direction, and we appreciate your concern and your attention to the situation.

Mr. CHAPMAN. Dr. Talwani, we welcome you to the hearing today. As you know, I had an opportunity to visit the Houston Area Research Center recently. I was enthusiastic and excited about the work that you are about, not only in the area of geosciences but the other areas of research as well. We are very pleased that you are able to join us today and we look forward to your testimony. Please proceed.

STATEMENT OF DR. MANIK TALWANI, SCHLUMBERGER PROFESSOR OF GEOPHYSICS, RICE UNIVERSITY, HOUSTON, TX, AND DIRECTOR, GEOTECHNOLOGY RESEARCH INSTITUTE, HOUSTON AREA RESEARCH CENTER [HARC], THE WOODLANDS, TX

Dr. TALWANI. Mr. Chairman, Members of the Committee, I thank you for inviting me to give testimony here. This is the first time I have testified to this Committee, you are obviously very knowledgeable in matters of energy, and if some of my remarks appear overly simplistic, please bear with me.

I would like principally to make an argument for increasing Federal support for R&D. And I think I can very quickly summarize my argument by stating seven principal points.

The first is that there is an urgent need to increase domestic oil reserves.

Second point is there is oil in the ground that can be found and recovered.

Third point is there is a reasonable likelihood that a strong R&D effort aimed at new technology and at transfer of technology can indeed substantially improve our reserve position.

Fourthly, I would state that in the past, major R&D efforts have been carried out by major multinational oil companies. But it appears in the future—and I think this is a very important point—that R&D efforts aimed at locating and producing domestic oil by these large companies rank very low on their priority list.

Fifthly, increasingly important players in the domestic area will be smaller oil companies and independents. These companies have limited research and development capabilities, and they need assistance in this area.

The next point is that cooperative research programs which are driven by industry needs and which are partly funded by Federal programs represent a reasonable way to perform R&D in the oil and gas area. And I think that particular attention needs to be paid to transfer of technology and providing assistance to independents and small companies.

My last point is that a well-constructed plan for carrying out applied research in carefully-selected areas will provide near-and intermediate-term benefit to industry and should be carried out more strongly. It is vital to our national interests.

Now any time people ask for the Federal Government to support one area over another, a number of questions arise and many questions arise when it is suggested that the Federal Government increase its R&D funding in the area of exploration and production of oil and gas. Questions such as, is there enough oil and gas left in the ground to make the effort worthwhile? Is there any hope of recovering it at costs that are economically reasonable? Why bother

anyway, because much cheaper oil is always going to be available in the Middle East? What kind of research and what specific research projects should be undertaken? Who will support this research and who gets the benefits? How is the research to be carried out and how are the results of the research to be transferred back to actual operations in the field? What are the roles of oil companies, small and large, universities, Government laboratories in this effort. And most importantly, how will it be funded.

I do not pretend to be able to answer all these questions, but I would like to look at some of them. Some of the above questions are dealt with very succinctly in an editorial in *Science* magazine by Philip Abelson. I think Abelson's testimony is very valuable because he is a scientist of international repute and he has no personal interest. And I think a disinterested party's comments can be of particular value.

His argument I have paraphrased in the following, and it is a very simple one.

The estimated resource of petroleum in the U.S. is 625 billion barrels, which far exceeds the reserves of Saudi Arabia. However, in general, the cost of converting U.S. resources into reserves far exceeds the $18 per barrel established by OPEC. This is no news to many of you. Because of this low price, the major oil companies have downgraded the coterminous 48 States as an area for exploration. Instead they are emphasizing offshore, frontier areas, and foreign prospects. Now targeted-R&D could go far to reduce costs of converting an important fraction of this large resource to producible reserves. However, the small independent companies who will drill for and find most of the oil that is to be discovered do not have research capabilities. The Federal Government retains the outdated policy that the majors will do what is needed; consequently, this year $43 billion for imports; small change from the Federal Government for liquid fuel research.

I think this testimony of Abelson summarizes the arguments very neatly.

Mankin, Charlie Mankin, using available data, has estimated that oil imports will increase from 30 percent of total consumption in 1984—it is already up to 40 percent—to 52 percent in year 2010 under present policies. The import bill will increase from present $40 billion to above $60 billion. But given new technologies, the share of imported oil could possibly increase from 30 percent to only 35 percent. All of the figures are subject to uncertainty but I think the important point to be made is that the situation is going to get worse under any scenario. No matter what you do, the situation is very, very bad. The question is do you want it to be slightly bad or do you want it to be catastrophic. I think the choices are in those directions.

There is the argument for relative self-sufficiency in oil on the grounds of national security. I strongly support that argument. Others have made the argument on the basis of support for the beleaguered domestic oil and gas industry, and I also strongly support that. But in particular, the business of ever-increasing import imbalance attributed to oil, which is threatening to wreck our economy, is an argument that almost nobody can refute.

Now I have a number of figures for the amount of oil that can be recovered and I would like to make two points. Associated with existing presently-discovered oil fields, there are two varieties of oil that can be recovered in the future. One is oil that is subject to tertiary and other enhanced oil recovery. I think the numbers that I use are that a total of 300 billion barrels associated with presently-discovered oil fields; 100 billion will never be discovered or never be recovered, 100 billion with enhanced oil recovery and another 100 billion in complex fields that my friend, Dr. Fisher, refers to. This is oil that is already present in the nooks and crannies, hidden in complex fields and it can be recovered by existing means provided you can find out exactly where this oil lies.

In general, I think the enhanced oil recovery target, tertiary recovery, is in the intermediate term future in that the cost of recovery is going to be high and the argument is that we must, by doing research, position ourselves so that, as the price increases, tertiary recovery and other recovery methods would have been sorted out.

I would particularly like to focus on the oil that is in existing fields, which is not discovered because the fields are complex, and the trick is to look at the subsurface much more carefully. I would like to give the analogy of a man—medical analogy of a man who has a tumor in the brain. There are various ways of locating the tumor, one is to make a number of drill holes in his brain to find out where the tumor is. We might find it but you might kill the poor gentleman. The other is the CAT-scan method where you, by non-invasive surgery, you look for that tumor.

I think the analogy can be carried on very nicely in the oil area in that now we have increasing capability through supercomputers, through new mathematical techniques, to image the subsurface better. By doing experiments on the surface, we can through recent developments be able to look and see where those small hidden reservoirs might be. This is a direct development of new technology and in my judgment it is the kind of technology which will enable us to produce oil in existing fields at possibly even lower cost. And this is the kind of direction that I would like to stress.

Now again, the major oil companies who could have the resources to do research in that direction, do not intend to do that very strongly, and it is in the interest of independents, small producers that this kind of research be carried out. And I would like to state, as others have stated, that a research policy or research direction which is driven by industry needs but which is carried out through cooperative programs both by the industry and also by the Federal Government. These are the kinds of programs that are needed to develop these new research methods and then transfer that technology to independents and smaller companies who will be able to use this.

In my written testimony, I have stated the kinds of research area and I will just mention them by name and not go into great detail. To a large extent characterization of reservoirs, imaging of subsurface reservoirs through these new techniques could be very important.

The second area is what many people call direct detection. It should be possible in the future—again, instead of simply looking at structures that are suitable for production of oil and gas, we will

be able to detect oil and gas in the pores of the rock directly from the surface. I think this is a very useful area.

There are also obviously a number of areas of research which could lead to enhanced oil recovery.

In addition, I think major research facilities now exist within larger oil companies. And if we have to help independents and small companies, we need to develop new research facilities, again cooperatively with the help of federal funding and also perhaps industry funding. And then these research facilities would be used to help the smaller producers.

So in sum, I would like to say that R&D efforts could be very important. They would, as I said, not prevent the catastrophe but they might ameliorate what is going to happen. We have a difficult problem ahead of us and I think a very important point here is that we have to start well in time before things get much worse.

Thank you very much.

Mr. CHAPMAN. Thank you very much, Dr. Talwani. We appreciate very much your testimony and found reading your written statement to be very enlightening and well-reasoned.

[The prepared statement of Dr. Talwani follows:]

Testimony presented at Congressional Field Hearing,
Marshall, Texas - May 13, 1988

by

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A strong argument can be made for increasing federal support for research and development in the area of oil and gas exploration and production.

Let me start by summarizing the main points of the argument:

1. There is an urgent need to increase domestic oil reserves.

2. There is oil in the ground that can be found and recovered.

3. There is reasonable likelihood that a strong research and development effort aimed at new technology and at transfer of technology can substantially improve our reserve position.

4. In the past, major R&D efforts have been carried out by major multinational oil companies. It appears in the future, R&D efforts aimed at locating and producing domestic oil rank low on the priority list of many of these companies.

5. Increasingly important players in the domestic area will be smaller oil companies and independents. These companies have limited research and development capabilities and they need assistance in this area.

6. Cooperative research programs which are driven by industry needs and which are partly funded by federal programs represent a reasonable way to perform R&D in the oil and gas area. Particular attention needs to be paid to transfer of technology and providing assistance to smaller companies.

7. A well constructed plan for carrying out applied research in carefully selected areas which will provide some near and intermediate term benefit to industry should be carried out.

Many questions arise when it is suggested that the federal government increase its research and development funding in the area of exploration and production of oil and gas. Is there enough oil and gas left in the ground to make the effort worthwhile? Is there any hope of recovering it at costs that are economically reasonable? Why bother anyway, because much cheaper oil is always going to be available from the Middle East? What kind of research and what specific research projects should be undertaken? Who will support this research and who gets the benefits? How is the research to be carried out, and how are the results of the research to be transferred to actual operations in the field? What are the roles of oil companies (small and large), universities, government laboratories, etc. in this effort. And most importantly, how will it be funded?

Some of the above questions are dealt with succinctly in an editorial in Science magazine by Philip Abelson[1]. Abelson is a past editor of

Science magazine; he is a scientist of international repute and as a disinterested party his comments are of particular value. I have paraphrased them in the following:

> "The estimated resource of petroleum (in the U.S.) is 625 billion barrels, which far exceeds the reserves of Saudi Arabia. However, in general the cost of converting U.S. resources into reserves far exceeds the $18 per barrel established by OPEC. Because of this low price, the major oil companies have downgraded the coterminous 48 states as an area for exploration. Instead they are emphasizing offshore, frontier areas, and foreign prospects. Targeted R&D could go far to reduce costs of converting an important fraction of the 625 billion barrels resource to producible reserves. However, the small independent companies who will drill for and find most of the oil that is to be discovered do not have research capabilities. The federal government retains the outdated policy that the majors will do what is needed - consequently, this year $43 billion for imports; small change (from the federal government) for liquid fuel research."

Since the U.S. is producing oil at a faster rate than the reserves are being added to, the trade imbalance attributed to oil imports will only get worse. Mankin[2] has, using available data, estimated that oil imports will increase from 30.9% of total consumption in 1984, to 52.2% in the year 2010, under present policies. That is, the import bill will increase to

above $60 billion. But given new technologies the share of imported oil could possibly increase from 30.9% to only 34.6%. In other words, the situation will indeed get worse under any scenario, but it will get far worse if no plans are made to develop new domestic reserves. These estimates are subject to a number of uncertainties but every single estimate clearly says that the import position will materially get worse if no special efforts to implement new technologies are carried out. The argument for relative self-sufficiency in oil on the grounds of national security have been made by a number people. Others have made the argument on the basis of support for the beleaguered domestic oil and gas industry. While I strongly support these arguments, reasonable people might take different views about them. But no reasonable person can deny the argument of the large and increasing trade imbalance attributed to oil imports. Surely there is an urgent need to increase domestic oil reserves in order to reverse this trend. There seems to be little doubt that relatively modest expenditures for oil and gas related research would help redress some of the imbalance. Reducing the cost of oil produced domestically by new technology is obviously a better solution than relying ever increasingly on imported oil.

There are various estimates for the total amount of oil present in the ground in the U.S. (we will deal only with oil here; but many of the arguments are equally applicable to gas). Abelson cites the figure of 625 billion barrels. Others have cited somewhat different figures - an amount of 300 billion barrels is quite commonly mentioned in connection with oil

present that is associated with presently discovered fields. The difficulty, of course, is that we are talking about oil that has not yet been discovered or recovery processes that have not yet been developed. Therefore the uncertainty in estimates is large. However, all estimates are at least about an order of magnitude larger than the present oil reserves of 28 billion barrels and therefore even large uncertainties in the amount of total oil present in the ground do not materially change the arguments presented here. The next question is whether there is a reasonable likelihood that a strong research and development effort aimed at new technology and at transfer of technology can substantially improve our reserve position.

Let us now focus on the oil commonly mentioned in connection with presently discovered fields which is not recoverable with present knowledge and technology. This oil represents an obvious target for the future because it does not imply that we have to discover new fields, which is an expensive task, but that we have to go back to known fields and take another look. The oil associated with presently discovered fields, but which cannot be produced with present knowledge falls into two categories. One is the so-called residual oil, the oil that is left in the swept part of known fields. When we speak of Enhanced Oil Recovery (EOR) in the narrow sense of the term, it is this residual oil that we are referring to. In spite of the fact that large amounts of residual oil are known to be present in swept reservoirs, only a small amount of this oil is being recovered at present by EOR operations in the United States (about 7% of

domestic production, which corresponds to about 15% of crude oil imports). High costs and lack of complete understanding of the details of some of the recovery processes involved have inhibited the rapid of EOR operations. More fundamental and longer term research is needed to develop and bolster EOR methods. It is not quite certain how much oil in the ground can be recovered by EOR operations. The Department of Energy and Lewin & Associates[3] estimate that if the price of oil were $50 per barrel, 14 billion barrels could be added to the reserves. Hirsch[4] cites a possible range of 7-110 billion barrels. The considerable uncertainty arises out of the fact that much research and development needs to be done before reliable estimates of oil economically recoverable by EOR methods can be given. However, there is no question that this oil is present in the ground, and that an important fraction will be ultimately recoverable by EOR operations. My own feeling is that these operations will become increasingly economical as the price of oil goes up and it would be very sensible to do the research and development of new technology to produce this oil in advance of the time that the new technologies become economically feasible. Thus, although the fruits of research may mostly be in the intermediate term, it is important to get started now.

A second class of oil associated with present fields is the oil that is mobile and could be recovered by present technology. Although this oil lies in and around presently known fields, its exact location has not been pinpointed and therefore it has not been recovered. In reservoirs that are homogeneous and relatively simple geologically, it is often possible to

recover most of the mobile oil, but where the fields are complex and the reservoirs tend to be inhomogeneous a lot of oil that is present in the fields is easily overlooked. The technology that is needed to recover the remaining oil (and I would like to include this in an expanded definition of EOR) is geological and geophysical in nature. Geological - in order to understand the nature of the patterns in which the sediments were originally deposited or subsequently modified. Geophysical - because geophysical techniques which would image the subsurface would be able to pinpoint the likely reservoirs. The principal point that I would like to make is that the efficiency of infill drilling would be enhanced considerably by the application of geological studies and advanced geophysical methods. I frequently compare the location of relatively small hidden reservoirs to the location of a tumor in the brain. You can locate a tumor by random drilling into the skull, which is likely to kill the patient, or by sophisticated methods, such as CAT scan, which will pinpoint the presence of the tumor. Sophisticated geophysical imaging of the subsurface depends on the development of mathematical methods and on the availability of computers. While the mathematical methods have been available, the time taken and the cost of computing, have been prohibitively large. However, in the last four years the development and availability of supercomputers makes this task economically feasible. Applied research is still necessary in order to program the supercomputers efficiently to allow us to image the sub-surface accurately. Such research will be very rewarding.

Geological and geophysical research focussing on determining reservoir inhomogeneities and discovering complex and subtle traps and seals can be of enormous help in targeting infill drilling in fields where the geology is complex. Such research will yield the most immediate benefits for several reasons. Firstly, the amount of mobile oil that is recoverable is large. Fisher[5] estimates it at 80 billion barrels for the entire U.S. Even if some of the mobile oil cannot be recovered because of other problems associated with production, the amount of oil that is recoverable should make a major impact on our present oil reserves. Because no new recovery processes need to be developed to recover this oil from known fields, it is probable is that the cost of recovering this oil from known fields will actually be lowered by using advanced technology to find it. This is a very attractive proposition and should be vigorously pursued.

I might digress briefly to make the point that there has been a change in the motivation for research from the 1970's to the present time. In the 1970's where the expectation was that the price of oil would go up very high at an early date, the research was such as to be useful for producing oil at a relatively high price. It was with that view that the Department of Energy supported research that was longer term in nature and was not aimed at short-term needs of lowering the cost of oil an gas, but rather at the longer term prospects of uncovering new energy sources. The immediate problem of fossil fuel research was left to the oil and gas industry. What we find now is that the research that is going to be most valuable and assumes increasing urgency is that which is aimed at recovering the oil at

a low cost and it is this kind of research that should have the highest priority.

In the past, major R&D efforts have been carried out by major multi-national oil companies. I believe, however, that in the future R&D efforts aimed at locating and producing domestic oil may rank low on their priority list. Mankin[2] in his testimony to Congress has explained why the major, multi-national oil companies are finding it increasingly difficult to conduct research on long-range lower 48 petroleum related issues.

> "It is not that these companies are in some sense "un-American." Their economic viability demands that they invest in the most attractive opportunities available, anywhere in the world. To give you an idea of why the multi-nationals increasingly look abroad, let us examine the relative attractiveness of domestic versus foreign opportunities by contrasting two simple indicators - number of wells and production profile:
>
> According to a world oil survey in 1984 the U.S. had 85% of the free world's producing wells and drilled three-fourths of the free world's new wells. But, it produced only 16% of the world's oil with an average production of 14 barrels per well per day, compared with a free world average of 248 barrels; many areas were much higher, e.g.
>
> - Mexico at 801 barrels per day per well;
> - Norway at 4,100;

- United Kingdom at 5,341;
- Saudi Arabia at 12,011; all from flowing wells that do not even require pumping, let alone enhanced recovery.

In brief, the U.S., especially the lower 48 onshore regions, are highly mature exploration and development provinces, meaning that newly discovered fields will be small and per well production will be low, relative to foreign prospects; major growth in U.S. reserves will come from new, more efficient technologies, more intensive development, and from marginal resources.

Simply put, the multi-nationals have severe financial constraints and more attractive investment alternatives, abroad and on Wall Street, than R&D, EOR or marginal domestic resources."

I believe that in the future, increasingly important players in the domestic area will be smaller independent oil companies. While the top ten producers produce slightly over 40% of oil in the U.S., it is clear that a significant amount is produced by smaller companies. If domestic production is to increase, these smaller companies will have to play a very large role in it. I think there is a case here when the mutual interest of the nation as a whole and that of the smaller oil companies coincide. Increase in domestic production is on the one hand extremely beneficial to the nation from the point of view of balance of payments; on the other hand the independents and smaller companies which have borne the brunt of

the energy crisis will benefit greatly if steps are taken through the development of new technology to make it economically viable for them to explore and produce oil domestically.

Since the smaller companies have limited resources to perform R&D, some changes may be necessary in the way in which oil and gas related research is carried out in the U.S. I think a major change should relate to the Department of Energy funding. In the past, it has consciously stayed out of shorter-term applied research in the oil and gas area - the argument being that that was in the province of industry. However, as we have pointed out, the major oil companies which conducted most of the research in the past, have had a decrease in interest in domestic oil and gas, and in fact, as has been pointed out by many observers, there have been large cut-backs in the research staffs of the major oil companies.

I also believe that it would be not proper to entrust the Department of Energy with the entire responsibility of conducting incremental research in the fossil fuel area. What is needed is some innovative solutions to solve this problem. One idea that has been suggested in many forms is of a cooperative partnership between industry and the government, and also incorporating academia. Although there is a variety of ways in which such a partnership would be formed, some ideas seem to emerge quite clearly. One is that the research should be driven by the needs of industry, and the specific projects that are carried out should be determined largely by industry representatives. It will be necessary to conduct both short term

applied research and long term basic research. It seems logical that much of the basic research be carried out at universities, but it also seems appropriate that a large part of this research (even though basic) should be Targeted. In the area of delineation and characterization of reservoirs in complex fields and in the area of enhancing production of oil through tertiary processes, etc., Targeted basic research is going to be very necessary.

At the same time, the bulk of the applied research would probably be carried out outside universities. Many ideas have been put forward how this research should be funded and carried out.

Without trying to design a precise organization to carry out this research, I would like to suggest that the design of the organization should take the following points into account.

1. It should be driven by industry needs and priorities. The research might comprise both proprietary and non-proprietary elements.

2. Part of the funding should come from industry. Cooperative research in which a number of companies will pool their resources together has important cost benefits.

3. A part of the funding should come from federal sources - particularly from the DOE.

4. Research should be conducted with the help of state of the art facilities which should be established for this purpose.

5. A strong effort should be made to involve academic researchers where appropriate.

In the following we briefly describe the research theme that should be followed and research facilities that should be established to carry out this research.

RESEARCH THEMES

Three recent reports (6),(7),(8) have addressed the question of research Targeted at recovering oil from existing domestic fields. The following discussion utilizes the findings in these reports.

A number of research themes are emphasized in these reports. These include the following:

Reservoir Characterization at a number of scales has been stressed. At a regional scale geological investigations about regional patterns

of sedimentation, folding, faulting and diagenesis are important in planning exploration and production strategy. At a macroscopic scale that deals with reservoir complexities within fields, the determination of heterogeneities is especially important in guiding infill drilling. At a microscopic scale pore geometry and other characteristics are relevant to production problems.

Subtle, complex and hard-to-see traps. Elucidation of complex structural and sedimentary traps is connected to the problem of reservoir characterization. Understanding the subtle aspects of the reservoirs and of trapping mechanisms is crucial to increasing the success ratio of infill drilling as well as in exploratory drilling.

Enhancement of seismic methods. Geological understanding is obviously important for reservation characterization, as well as for discovering complex and subtle traps. However, the greatest advances in these areas will probably come from enhancements in seismic techniques. A particular goal is higher resolution. To be able to resolve physical properties (from seismic observations) at a scale of one or a few meters at reservoir depths (say 1,500 to 3,500 meters) would be extremely useful. Higher seismic resolution will have to be obtained by developing seismic sound sources that produce energy at high enough levels to penetrate to reservoir depths. Further development in the use of shear waves and in the development of instruments to simultaneously generate compressional and shear waves and to record

them are important to characterize subsurface materials. Very fine scale seismic experiments will generate large data sets. For their interpretation we require enhanced tools such as supercomputers as well as enhanced processing methods.

Seismic determination of lithology and fluid content. Careful measurement of the variations with offset of the amplitude and phase of seismic reflection data is being used at present to demonstrate the presence of gas charged sands. Further refinements of these methods, together with use of shear waves and with better knowledge of rock properties, could help detect lithologies and estimate the nature and amount of fluids present in a reservoir. Estimation of reservoir properties such as porosity and fracturing is an important goal of such studies. We may ultimately be able to directly detect hydrocarbons and estimate how much of their volume can be recovered.

Borehole measurements. Borehole research includes the development of improved logging tools and increased use in placing seismic source as well as recorders for cross hole measurements. Further refinements of such techniques, together with surface sources and recorders could lead to very complete definition of reservoirs between and around boreholes.

Physical and chemical properties of rocks. A more thorough understanding of physical and chemical properties of rock and their

variation with temperature, pressure and fluid content is important for many exploration and production problems. In particular, for the derivation of lithology, fluid content, and extent of fracturing, the knowledge of the physical properties and how they effect the transmission and attenuation of seismic waves needs to be accurately known.

Prediction of transport mechanisms in reservoirs. An important research theme is to understand how rock pore morphology, mineralogy and fluid compositions can be used to predict parameters, including permeability, dispersivity, etc., which control hydrocarbon production, trapping, and remobilization in recovery processes. Research should include (i) experimental methods to determine pore structure and composition; (ii) understanding and modelling rock fluid physical, chemical and thermal interactions; and (iii) developing pore level flow models and statistical scale-up theories which predict the transport and other properties controlling the hydrocarbon recovery process.

Dispersion/mixing. Dispersion and mixing processes on different scales (from pore level to macroscopic heterogeneities) have profound impacts on how hydrocarbons can be contacted by various recovery agents. A sound conception and theoretical basis, supported by experimental research, needs to be developed for quantitatively predicting dispersion and mixing effects.

Integration of geological, geophysical, and engineering methods. Many of the research themes cited above need a close integration of geological, geophysical and petroleum engineering disciplines to pose and solve the most pressing research problems. Interdisciplinary coordination of research efforts must be very strongly emphasized.

RESEARCH FACILITIES

The importance of up-to-date facilities in support of first rate research is obvious. The following facilities are judged most important for the research themes discussed above.

Subsurface test facilities

One or more subsurface test facilities are needed, in conjunction with studies at regional, field and reservoir scale in a hydrocarbon producing area. A subsurface test facility will ideally have the following attributes:

- subsurface geologic framework from drilling
- availability of a good data base (logs, cores)
- a grid of good quality 2-D seismic data which extends beyond the productive area
- correlative outcrop sections
- long-term access for monitoring
- cost-effective additional drilling, coring, and logging

The subsurface test facility will be used for the testing of tools and concepts to be used in exploration, infill drilling, EOR and reservoir management. The test facility will provide a geologic system having known structural, stratigraphic, and reservoir properties in three dimensions for testing geophysical techniques such as 3-D seismic, cross hold, VSP, logging, etc., and for testing reservoir performance to the extent possible.

Seismic and electrical instrumentation and interpretation facilities

A considerable effort is needed in the development of new exploration seismic tools, e.g., higher frequency seismic sources, shear wave sources, generation and detection of multi-component seismic signals. Test facilities should provide the possibility to test various acquisition schemes and geometries. Also available should be closely related processing and interpretational facilities.

Facilities for petrophysical measurement and study

For the conduct of the research, it is essential to have access to one or more centers for petrophysical measurement and study. Reservoir characterization and all advanced geophysical techniques depend on accurate petrophysical measurements. In addition to the conventional measurements of porosity, permeability, and capillary pressure, facilities for measuring the sonic and electrical properties are essential. In addition, the facilities should be able to handle the special requirements needed for

evaluating EOR processes and various aspects of reservoir management, such as the effect of completion and stimulation procedures. As dictated by the needs of more advanced geophysical techniques or recovery processes, it may be desirable in the future to provide state-of-the-art laboratories capable of simulating subsurface temperatures, pressures, directional stresses, and fluid-fill conditions for measurement of rock properties, fluid properties, and rock-fluid and fluid-fluid interactions.

Computing Facilities

Advanced seismic data processing, in particular, requires extensive computing facilities. Development of 3-D seismic, considered essential to delineation of traps and description of reservoirs, makes large demands on computer speed and storage capacity. These demands will be amplified when 3 component seismic signals are generated and recorded. Supercomputers with large storage capacity and high input-output rates are needed to deal with these data. Computing centers should include multiple workstations, interactive high speed graphic facilities and extensive networking.

Integrated modeling and analysis system facility

This facility is not designed simply to store or organize archival data. Rather, by using proven elements of artificial intelligence software, it will be designed to integrate and interactively improve the interpretations made by using diverse sets of data. For example, by using

well logs, seismic data, rock properties, fluid properties, and production measurements, it should be possible to develop a system that improves the definition and calibration of given reservoirs as well as of predicting the properties of new reservoirs. Similarly, conceptual structural and stratigraphic models, outcrop data, well logs and core data, and detailed seismic data can be used to define more precisely and more automatically, subsurface geologic conditions. We believe that these knowledge-based systems should constitute a facility which will find multiple uses in a number of research areas.

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Mr. CHAPMAN. Let me add at this point, we will make each of your written statements fully a part of the hearing record and include those in the record for all purposes.

Gentlemen, thank you for being here today. We have a few minutes for questions and I would like to defer to my colleagues at this time and let them address any questions they may have of this panel in the remaining minutes that we have, if they have any questions at this time.

Congressman Boucher.

Mr. BOUCHER. Thank you very much, Mr. Chairman. I think we had very valuable testimony here today.

Dr. Talwani, I notice from your statement that the major oil companies are not providing any substantial funding today for research with respect to mapping. Can you explain to me why that is not happening? Obviously there is a value in doing that in terms of determining where the reserves are. Why is that money not being spent by the private sector?

Dr. TALWANI. I think they are spending money but it is considerably reduced from 1985 levels. And also I think their principal interest is they have to make money and they are shifting to the far offshore and to foreign areas. That does not help the domestic industry. I think it is just simply a matter for them of where they can get the most profit.

Mr. BOUCHER. Is the university community spending substantial sums today with respect to mapping research?

Dr. TALWANI. I think the university community, in doing regional large-scale mapping, is doing some—but the kind of research that is needed to map oil fields, the university community has the capability but has not done so. That has been in the province of the oil industry, and I think what we need now is a union between independent's support by the Federal Government and universities to do that kind of mapping on a scale that would be useful for oil and gas purposes.

Mr. BOUCHER. Could you and perhaps the other witnesses suggest to us what do you think the proper mix is with respect to funding, taking into consideration the roles of the Federal Government, the university community and the industry? Can you assign some suggested percentages to the funding? And a second part of the question is what do you think would be an appropriate annual funding level to achieve a solid program for enhanced oil recovery?

Dr. TALWANI. Those are tough questions, let me take a try at them. My personal opinion on this and not based on any great thinking but from discussion with colleagues, is perhaps 50 percent from industry and 50 percent from the Department of Energy in a partnership where the Federal Government funds would be directed more toward basic research and the industry funds would be directed more toward applied research, and sharing the facilities may be the kind of direction that we want to go in.

As far as the amount of money, a suggestion that a number have thought about is granting some sum of $10 or $20 million to at least $100 million at the end of, say, a five-year period and then maintaining at that level. I think you want to spend the money

wisely and I think you have to build up the kind of infrastructure and research capability that would be able to utilize those kinds of funds.

Mr. BOUCHER. Mr. Carlile.

Mr. CARLILE. I would like to speak to this specifically in the area of actual practice out in the field. There has been some funding in the area of stimulation, sand fracking, hydraulic fracking of wells that has been funded through the efforts of this Committee. It has been a very limited amount, and in this particular area the industry as such has probably, along with research by Halliburton Well Services, Dow Well, so on and so forth—research by these industries and by the individual companies that have spent the money, has been almost 100 percent industry. From the standpoint of the Government effort in there, they did an atomic explosion out in Colorado or somewhere out in there to try to increase the productivity of these type sands. I do not know that we ever got any information that was very useful out of that, but today we are sand fracking wells in this area utilizing a million to a million and a half pounds of sand. If you have ever seen a million pounds of sand, it would cover most of this room in a pile, it is a large quantity. We are using stimulation techniques where we are trying to move sand out of a 1,000 or 1,500 feet of bore hole. This is very, very effective in increasing the flow capacity of wells throughout this area.

These areas, we need a lot of help. We need joint funding. Certainly, industry is more than willing to pay a substantial part of the cost. It has been only a few years since the first well that was fracked with over a million pounds of sand was formed here just north of Marshall. Congressman Chapman, you probably remember there was much, much media attention to this particular well. But now it is very common practice.

This will increase the amount of recoverable reserves from these tighter sands. They have got the same problem in Oklahoma. We need to know a lot more about what we can do to recover more of the oil and gas in place and in this area there is very little being spent that we know of, there is very little coming to us of any benefit, and we are spending 100 percent of our dollars in this area. We need help in this area.

Mr. BOUCHER. Mr. Carlile, I appreciate very much that statement.

Mr. Chairman, I do not want to take a lot more time. I would just like to compliment all of the witnesses here on the excellent testimony they have presented today. I think you make a good case that there should be a substantial Federal role in supporting enhanced oil and gas recovery. I was particularly interested to hear Dr. Fisher say that those who suggest that enhanced recovery research really would not serve to reduce imports are erroneous in that statement. His opinion, well studies I am sure, is that there would be some reduction in oil imports if that happened, and I think that is the kind of message that can serve to convince members of the Congress that a Federal role is in fact appropriate.

Given the outstanding leadership of your Congressman Jim Chapman, I am sure that that message will be sold on Capitol Hill,

and I thank you very much for what you have had to say about that today.

Mr. CHAPMAN. Thank you, Rick. Congressman McCurdy?

Mr. MCCURDY. Thank you, Mr. Chairman. I just want to say amen to Rick's statement and say let us get the baptismal ready and get him out there on the floor. We need to have statements like that from Members of other regions that have other concerns and certain constituent pressures, and I think it is just a service in itself to have Congressman Boucher here and to have his input.

I know that Congressman Downy, who represents New York was recently in Oklahoma and Texas and came back absolutely convinced that the windfall profits tax was bad, and before that he had been supporting it on the Ways and Means Committee. And this year we have a chance to repeal that, but you are right, Mr. Merritt, the President should not veto that trade bill. If he does, we have a real good chance of losing the repeal of the windfall profits tax. I voted against the plant closings provision, but I can tell you if I have to trade between plant closings and windfall profits repeal, I am going to take the repeal of the tax any day, because that is the one symbolic thing today, because it is symbolic today, if the price of oil goes back where it should then that is a major detriment to further exploration. So I would have to concur there totally.

Let me just say one thing. We keep talking about national energy policy. My friends at the table there, we do not have a national energy policy. Everybody keeps referring to it in this testimony and everywhere else, but there is no such thing. This Administration when it came into office said the free market was going to rein, and they wanted to eliminate the Department of Energy and they said we do not need a national energy policy, it will be taken care of. Well, we see what the result has been. And I can surely identify with the plight of east Texas because in my District, my District led the State of Oklahoma in the number of bank closures in the last five years and I have scores of people that are unemployed today and it not only affects the independents, it affects the jobbers, it affects the suppliers and the tool manufacturers and we see people like Mr. Merritt here having to go to other areas of industry to survive, but we hate to lose that capability in the oil field.

One of my Republican colleagues from Oklahoma who is a first-term Member, I was surprised to hear him say the other day—it took him about a year to find it out—he said that he realized, as being one of those who supported the President on virtually everything that he has done, that he could not find a single person other than Secretary Hodel, who is Interior, not Secretary of Energy, who understood the lack of a national energy policy and that we needed to move there.

I have seen Herrington's letters and Congressman Chapman is well aware because he has been involved too, that Herrington basically said we do not have an energy problem. That is right, he said that, we do not have an energy problem. Now I do not know if he is consulting his astrologer or his pollster or who, but the fact of the matter is he does not understand the plight of independents and people in southwest Oklahoma and certainly in Texas.

The question I have, and I was going to ask Mr. Carlile, because I know you are a supporter of the free market and free enterprise, and I passed your building coming in so I know you have been successful; but what effect do you think these mergers have today on this R&D. You know, this acquisition thing scares us to death in Oklahoma. We used to have a pretty good oil company called Phillips and they are so deep in debt right now because of the action of some folks from other States, by the way, that have not set too well. And Halliburton fortunately has been able to stave off those, but they are in my district, in Duncan. And the layoffs there, took one county, Rick, and Rick's got southwest Virginia, but in one county in my District, we rose from 2% unemployment to about 12% unemployment in a matter of two years because of Halliburton alone, because of the drop in the oil-well service business.

But I would be interested in what effect these mergers have on the R&D and whether you think that something ought to be done there. Dr. Talwani, Mr. Carlile, what do you think?

Dr. TALWANI. I used to work in the R&D Department of Gulf Oil and when Gulf Oil merged with Chevron I was out looking for another job. That is not strictly true but nearly true. What has happened is that the research staffs of major oil companies were substantially reduced because they took on large debts. And I think this has had very serious implications.

Also the kind of research, especially enhanced oil recovery research, and even the kind of exploration research that I am talking about, were the ones that suffered most. So I think the mergers have been very negative on the R&D effort.

Mr. MCCURDY. R&D is the first area cut. When you start trimming, I do not care what business you are in, or even DOD, when you have tight monies, R&D goes first, and areas such as this really do get impacted.

Let me mention something about the Fuel Use Act. That is a constant struggle, we did have a repeal but DOD—I led the effort and joined by my colleague from Texas here—there was a provision in the DOD bill that required us to purchase Pennsylvania-grade coal, it was not Virginia coal, it was Pennsylvania-grade coal and ship it to Europe to burn on our U.S. military facilities there, and it cost about $3 billion a year. And I led the repeal and Jim supported me, and we were able to repeal that provision, but that was on the books for years. There all kinds of those provisions in there that we have to constantly be aware of.

Let me make one last point, and I do not want to dominate the time here, but the oil import fee. Now I am a supporter of the oil import fee and I know Jim is, but you know, industry has been divided on that and it is rather disturbing to me. If we had passed an oil import fee three or four years ago when it really would have made a significant difference, it could have helped stabilize the situation some and certainly raised a lot of revenue. You know, we have tripled the national debt in eight years, that could have played a major role. But the industry fought it, the majors were opposed to it because they had outside interests and it was TIPRO and North Texas Oil & Gas Association that I am very familiar with and have been working with, that came out in early endorsement. As a matter of fact, one of the Senators from Texas is op-

posed to oil import fee, as I understand. And that kind of division has hurt us in our efforts to secure that fee.

Is it protectionism? No. Is it good economic sense? Yes, I think it is, because we are not dealing with a free trading situation, we are dealing with a cartel. We are dealing with a cartel that intentionally is driving down prices to eliminate an industry, and I think they have done a damned good job at it. And it is unfortunate that we are in that situation today. But I still think an oil import fee is valid.

Mr. Carlile, would you comment on that? Am I wrong?

Mr. CARLILE. Certainly, we have supported an oil import fee from the inception. It gets to the point in time I guess where you say, "Well, the old dog will not hunt, so let us see if we can find another dog here that will function for us". So which direction do you go. The oil import fee is the most logical approach seemingly. But then they want to put all the various and sundry exceptions and exemptions, and we cannot involve the chemical industry and so forth and so on, to come through the back door and provide some type of credit or tax benefit or something, we have got to get the money flowing into exploration.

And I do not know, the critical situation today, according to the Stainer Reports that reports on funds being raised in the public arena, they are estimating about $100 million being raised in public funds this year for oil and gas exploration. But that is nothing. Now there are private placement monies being raised, but they are small. And the independent oil and gas industry as such does not have the capital base, we do not have the banks willing to make the loans; therefore, you do not have the funds to go out and do exploration with. So what is going to happen? More and more independent oil and gas operators are going to sell out and leave. They are doing it every day. Of course, you have these large funds being raised to buy reserves. I get two or three telephone calls every week from people who want to buy our oil and gas reserves. Well once you sell your reserves, you are out of business. You can junk your rig, you can close the doors, lay off 250 people out there—they will if you sell your reserves, and you do not have anything left, may keep a few switchers and so forth.

Mr. O'BRIEN. Congressman.

Mr. MCCURDY. Yes, sure.

Mr. O'BRIEN. I would like to echo that from our membership, TIPRO. If you go to meetings, people still support an oil import fee but the fight for that has gone on so long and it seems like we have lost so many battles on it, that the real crucial need right now is simply cash flow. People are going out of business right and left and while we would like to see it, and support your efforts and Congressman Chapman's and Senator Bentsen's efforts to impose one, a lot of our membership just feels like it is time to move on and concentrate on other areas where maybe we can be more successful.

Mr. MCCURDY. I was going to issue a caution though, and that was my next point, and—you mentioned the tax credit, I do not know how our friend from Virginia vote, but I know how our friends from Texas voted on the tax simplification—tax reform bill which dealt another blow to the independent oil business. And I

am afraid that as admirable as it is and as much as I support the concept, I do not think there are tax credit incentives out there today. I do not think—and I am saying—if I can do anything, I can read the Congress and I know how to count votes, and my concern is that unless you have vigorous Administration support—we probably could have had the votes for an oil import fee, but the President opposed it. So if you do not have the President's support for a tax credit, you are not going to get it either. And it was his Department of Treasury that came up with that provision and that is devastating.

So I do not know what our next approach is, to be honest, I do not see an immediate tax incentive or tax credit that is going to come about. We fought to keep some portions of the depletion allowance. These are the kinds of fights—we are trying defensive actions as opposed to going out trying to create new ones. So that is a major problem that we have.

I would just conclude by saying that it is important that we have hearings like this, and the reason I came down, as much as I have learned in growing up in southwest Oklahoma about the oil patch, it is important that we have statements such as this on the record and that we have people constantly aware—it is a two-way exchange. I hope you learn something also from our comments, but at the same time we need that input and we need to update those comments and, Mr. Merritt, you are right, you told us so—most of us told them so in 1983 and 1985 and 1986. Dr. Mankin—I notice you quoted there in your statement—is from Oklahoma and he has testified, and we just cannot give up. We have got to just keep raising the level of interest and keep fighting and saying that this is a major problem.

I am reading a book right now, Mr. Chairman, that most people should read, it is kind of scary. It is called *The Rise and Fall of the Great Powers,* it is by Paul Kennedy, and it is on the current best-selling list. It talks about how great powers have diminished because the economic base erodes and they get over-extended militarily. And if we are not careful, we are on the same path, especially in the area of industry and the independents, energy independents.

And I just appreciate the Chairman taking the time and asking us to come join him. I appreciate each of you for your testimony today also.

Mr. CHAPMAN. I will not delay the proceedings other than to say two things that I think I would underscore. Mr. Merritt, your graphic description and first-hand knowledge of the deterioration of the infrastructure of the industry, I think is one of the stories that has not been told in Washington nearly as well as it should have been told by perhaps those of us that have been here to see it happen. And perhaps maybe we can do better and should do better, must do better, in helping our colleagues in the Congress understand that the business is not just a drilling rig that pokes a hole in the ground. That we cannot at our leisure and our option or on a whim, either cap and then go back and get it later on. The industry is something much broader than that. The deterioration and loss of the infrastructure is going to take a long time to rebuild if we do not reverse it immediately. It will take a long time now.

And I applaud that you addressed that point. I hope you will continue to do so, communicate that anywhere and everywhere you can because you have a unique perspective to talk about it from.

Mr. Carlile, let me say about the point you make on trade. Again it is something that nobody seems to have made the link and connected the fact while we talk and talk and talk about this trade imbalance and about a hundred and forty or fifty or sixty or a hundred and seventy billion dollar a year trade deficit, it seems like we look at the number and do not look at the components of what is it. We think in terms maybe of bashing the Japanese, and that is kind of the rhetoric. In the trade bill we are very fond of talking about stripping down foreign-trade barriers and that is important, not being protectionists but trying to open foreign markets. But you look at the components of that trade deficit and see what is the largest component. It is energy. It is the fact that we are importing that crude oil and our money and our capital is leaving this country—you point that out in your testimony graphically—in upwards, I understand approaching some months $5 billion a month that we spend on importing energy. We are never going to deal effectively with the trade imbalance unless we deal with this energy question.

You point that out in your testimony, and I hope you will continue to communicate that point and hopefully we will as well.

Mr. O'Brien, thank you for coming from Houston, we appreciate the work TIPRO does. And Dr. Talwani, again I think you are about the Lord's work where you are. We hope you will continue the Houston Area Research Center with your research and development efforts.

You have three strong supporters in the Congress here today on the research and development efforts. We have enjoyed some success in the last couple of years, largely because of the hard work of Members like Dave McCurdy and Rick Boucher. We will continue to work hard to try to focus the attention of the Congress and the resources of the country in an area that will provide some meaningful help.

While some of what we hear today appears to be bleak, and perhaps it is, I think things are better. We will have a new Administration, we will have a change of team in the White House, and whether it is a D or an R behind the name, we will have another opportunity with another crew to communicate our message and work in these efforts. And it is work that we cannot become discouraged, we cannot let down, it is too important to the future of this country.

Thank you all for coming today. We appreciate your time and attention. The press I think is going to gather outside for a press conference and I would like to invite the witnesses that have been here today to join us there for comments. The press may be interested in some of your thoughts and it might be an opportunity, since cameras and recorders were not permitted in the courtroom, this might be an opportunity for those that have attended here, may have some questions they would like to ask you and it would be a good opportunity for us I think to perhaps tells bits and pieces of this story to folks who can communicate it to others that can make a difference.

We thank you for coming today and appreciate your time.

Judge Hall has been in and out of the courtroom a time or two and let me just say for the record how much we appreciate his allowing us to use his courtroom, his hosting us here today. Sam Hall of course was not only a stellar but a tremendous Member of the Congress preceding me and his shoes, although I will never be able to fill them, I appreciate him at least allowing us to occupy his space here in Marshall and I certainly do want to thank him for hosting us here in the Federal Courthouse today.

Thank you all, the hearing is adjourned.

[Whereupon, at 12:27 p.m., the Subcommittee was adjourned.]

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